BULLETIN

OF THE

AMERICAN GEOGRAPHICAL SOCIETY.

Vol. XXIV 1892 No. 1

EXPLORATION ON GRAND RIVER, LABRADOR.

BY

AUSTIN CARY.

Current ideas of Labrador are derived from reports of the coast. Of the interior little is known except that it is a plateau, netted with lakes and flowages, which drain off the edges of the country in a number of very swift, rough rivers. The only account that is accessible of any extensive portion of it is that of Prof. Hind, who, in 1861, starting from the Gulf of St. Lawrence, penetrated the country for a hundred miles along the line of the Moisie River. The general height of land in this region he determined at about 2,200 feet. The country he reported to be naturally covered with caribou moss, and timbered to some extent; but great areas, cleared by fire of every vestige of soil and vegetation, presented an utterly desolate aspect of bare boulders and ledges.

The Grand River, the scene of the Bowdoin Exploration, is not laid down on many of the maps of the country. Nevertheless, it is said to be the largest river in Labrador, and was known years ago to the agents of the

Hudson Bay Co., who, in the early days of their trade, before the Indians had become dependent on trade with the whites, had stations on the lower part of its course. At length, in 1839, John McLean, in the same employ, but starting from Ungava, in the extreme north of the country, travelled up one of the Ungava rivers, crossed through the plateau lakes, and descended the Grand River, reporting on his return a great fall on the Grand River. This fall was subsequently seen by several employés of the company, but not by any accurate observer, and nothing was added to McLean's very general account.* Finally, travel on the river ceased, and river and falls were largely forgotten, until, in 1887, Mr. Randle F. Holme, of England, attempted their elucidation. He ascended the river for 170 miles, but failed in the main object of his search. His report,† however, served to direct attention to the falls, while he was able to make a map of the river, and to put on record many facts in the history of the region. Much that is in that report will, for that reason, be omitted from this, but it must be read with the caution that some of Mr. Holme's surmises about matters beyond the point of his own observation have proved very wide of the mark.

This was the state of things when Prof. Leslie A. Lee was planning the Bowdoin Expedition to Labrador in the spring of 1891. He therefore determined to send a

---

* See Hind "Explorations in Labrador," v. ii., p. 137.

† Proc. Roy. Geog. Soc., April, 1888. To Mr. Holme's list of men who have seen the fall, William Alves, now of Halifax, should be added. He says that about 1860, while on a journey to "Height of Land," or Fort Nascopee, he visited the fall with several others of his party.

party up the Grand River, and with that in view, boats, camp outfit and provisions suitable for such a trip were carried on the vessel which transported the entire party to the coast. The men to make up the party were all chosen from the vessel, and were either present or former students of the college. Guides were neither necessary nor obtainable, and it was believed that men could not be hired who would be in all respects so satisfactory as those picked from our own numbers. The party then consisted of the following men: D. M. Cole, W. R. Smith, E. B. Young, and the writer.

We had most of the objects of a scientific reconnoissance, for which a leisurely trip is essential. We hoped especially to map out the river and to render a clear account of its surroundings; and to that end went provided with sextant and chronometer, aneroid, compass, etc. But the vessel had to be home in September, while in working up the Labrador coast she was so delayed by fogs and ice that when she arrived in Hamilton Inlet it was decided that but thirty days could be allowed us for the trip. Now the falls were our destination—they must be reached, or our expedition was a failure. Uncertain then of their distance, and of the obstacles to be met, with the example too of Holme's failure before us, it was concluded that on the up-trip nothing should be allowed to interfere with our progress. The up-trip then resolved itself into a grand rush to reach the fall. Now, on the way back, as it proved, we had all we could do to take ourselves out of the country; so that the expedition, as a whole, was productive of far less accurate information than was hoped. In any inferences as to distance covered or obstacles

XUM

met, it must be taken into account that what was accomplished in this case was done by young and vigorous men, working steadily up to the limit of their strength.

The vessel entered Hamilton Inlet July 23d, and three days later, on Sunday, July 26th, being then near the head of Lake Melville, and within a few miles of the mouth of Grand River, she was hove to, the boats put over her sides, and the river party left to their own resources. Next morning we entered the mouth of the river, and met with a fair sample of it in the shape of a deep, strong current, which drove us at once into shoal water.

The river's mouth on the charts is put at about a mile wide, but, entering between the low, wooded points which bound it, it soon expands to two or three miles. The banks here are sand plains but a few feet in height, but gradually rising as we proceed. Several miles away on either hand, and parallel to the general course of the river, run high, steep-sided ridges, the prolongation of the rock walls in which the lake below is contained. Both plain and hills are wooded, and in this sheltered valley the trees grow to a large size. Joseph Michelin, the only settler on the river, was found by the party chopping spars. Except a camp of Indians, he was the last human being seen on the up-trip, while his house was a welcome shelter to two of us on the way down. One time and another considerable was seen of Michelin by the party. He was a hunter and trapper by trade, in parentage a mixture of Scotch, Eskimo and French Canadian, and a very bright and interesting man withal. He confirmed our own judgment about the volume of the river in high water. In spring, when

six feet of snow are melting over the country, the volume which pours down this great valley must be tremendous.

Twenty-five miles up the river is the lower fall, so-called, where a half mile of rapids, with a low plunge at each end, makes, according to Mr. Holme, a difference of level of seventy feet. Below the fall the river expands into a round pool several miles in diameter, across which, from the fall, runs a heavy and regular swell. This point was reached early on our second day, and here the crew was put to the first severe test. By that fall the outfit must be carried bodily, so after a square meal every man shouldered fifty pounds, carried it up the steep bank, over the level, and down to the water's edge on the other side. Our boats weighed eighty pounds apiece, and the outfit otherwise amounted to about 500 pounds. To carry it half a mile was a half day's work, that for the time being used up the crew. Rest was needed, and since during the two nights out nobody had slept much on account of the flies, camp was made and we prepared to take the comfort of the situation. A bed was made on the sand, with a tent of mosquito net over our heads, and then, our cooked food having given out, the cook got out his flour and tins and began his humble but essential ministrations. Camp cookery at best is rather a wearing process, but the agonies of a man whose hands are tangled up in dough, and whom the flies becloud, competing for standing room on every exposed portion of his body, can be imagined only by the experienced. Mosquitoes and flies are the chief obstacle to summer life in Labrador. When travelling for

XUM

any length of time in the woods, the blood they draw is a very serious matter.

The next two days were passed without noteworthy incident. We were gradually getting hold of the country. The sand plains were rising into terraces, and mounted finally to a height of several hundred feet. The rock walls still continued, becoming more regular and even. The vegetation was the subject of remark until its main features became familiar. Spruce is decidedly the tree of the region,* but fir, birch, hackmatack and alder are also abundant, while there was a variety of smaller vegetation. Berries were in places quite plentiful, and they figured largely in the diet of Cole and myself on the return. In fact, neither the weather nor the surroundings were markedly different from those that attend camping out in Maine at the same season of the year.

Sixty-five miles, as the trappers call it, from the mouth of the river, is Gull Island Lake. This was reached July 30th, and found to be some three miles wide, and to lie within banks of sand. Into its head runs the first of a series of heavy rapids, and here for the crew a different kind of business began. The Gull Island is a heavy, dangerous rapid, and, as we found it, was seven miles long. The next rapid centres on the first square turn of the river seen on the map. It is divided in low water into four distinct pitches, and has on each side many hard obstacles to pass; but the swiftest piece of water on the river, though of moderately easy passage

* Along the river, as has been said, large trees are found. On the plateau, however, a spruce eight or ten inches through would, so far as observed, be a large one. The trees are also thick and bushy.

on the north shore, lies for about a mile above and below the Minninipi River.* Connecting all these rapids is a swift current against which it is impossible to row, and in high water the rapid for this whole distance would be continuous. The passage up was rough work, and a number of short carries were necessary, while on one occasion we cut out a portage path of a quarter of a mile. Neither was the passage made without accident. One boat got to leaking, while the other was upset and many valuable things lost, including our only barometer and a quarter of our provisions. This disaster, due to the feeling of rush which begrudged the time required to lash in the loads, has been the subject of very great regret.

The river along here runs generally on the country rock, which on each side lies always close at hand. Emerging from the Minninipi rapid the river becomes wider, and, while a strong current runs in its channel, inshore good progress can generally be made with the oars. Camp was made August 3d, on an island six miles above the rapid, and a cache of a little flour and a can of beef left. The next two days, tracking being frequently necessary, we covered about thirty-five miles; while on August 6th the last recorded rapid was passed, and we reached the great landmark on our journey, Lake Waminikapou.

This point Mr. Holme called 150 miles from the mouth of the river, and I have no reason to revise his estimate.

* The party did not remain long enough about Hamilton Inlet to add to the nomenclature of the country as given by Mr. Holme. The river mentioned, however, seemed always to be pronounced as here spelled, and I have, therefore, in this respect, departed from Mr. Holme's usage.

XUM

A little beyond lay the furthest point reached by him, where, delayed by a gale, and with supplies exhausted, he had been compelled to turn back. This point we had reached in ten and a half days, and we felt thoroughly self-satisfied. And there was other cause for rejoicing; for it was a fine afternoon and amid grand surroundings that we entered the lake. As we gradually worked out of the swift water, the terraces of sand and stones were seen to give way, and the ridges beyond to approach one another and to erect themselves, until at the lake's mouth we entered a grand portal between cliffs on either hand, towering for hundreds of feet straight into the air. And looking beyond and between the reaches of the lake were seen, a ribbon of water, lying between steep-sided ridges, over the face of which, as we pulled along, mountain streams came pouring.

It was a time for enthusiasm, but leisure for enthusiasm was short. Rowing a few miles up the lake, we camped on the beach and made preparations for a record-breaking day on the morrow. That morrow was no disappointment. We put 40 miles to our credit, and at 6 o'clock in the afternoon in a pouring rain made camp five miles above the lake. Next morning, much to the regret of all of us, the party was divided. The distance of the fall was uncertain, while, owing to the upset, provisions were becoming short. Young, moreover, was useless. A strain, early in the trip, with continued labor, had caused his arm to swell and become painful, till he was unable either to work or sleep. He and Smith, therefore, taking necessary stores, started back for the settlement. They shot most of the rapids,

and reached Lake Melville in three days without accident, but in passage on a sail-boat to Rigolet, were caught one night in a squall and had to cut their boat adrift for their own safety. If these men had not turned round, the falls would not have been reached. The men who made this sacrifice did so willingly, and they deserve as much credit for the final success as those who went on.

Here I must digress a little to the structure of the country. The interior of Labrador, it is understood, is a plateau some 2,000 feet * in height; and the Grand River in this portion of it flows, not at the plateau level, but in a valley or trough cut into it to nearly its entire depth. This valley above Gull Island Lake is narrow, two or three miles wide at most, and even this width is in most places largely taken up by loose material, sand and stones, left here at an earlier period. The sides of this valley from the river level present, as I have mentioned, the appearance of parallel, steep-sloping ridges, the contour of which is often remarkably even for long distances. This is particularly the case through Lake Waminikapou and above. Except for one great vertical bluff on a sharp turn about thirty miles above the lake, I remember no other place up to the end of our travel where this contour is markedly broken. Through the rapids the contour of the walls is far less irregular, but at Gull Island Lake and for some distance below the structure comes out again with considerable regularity. The largest streams come in

* See Mr. Holme's paper. Our party never ascended to the plateau level except at the upper end of our travel, and the statements in this paragraph are consequently based on what was seen and inferred from the river level.

XUM

through deep branch valleys, and such branches are indicated on the map. A very picturesque feature of the river is the large number of smaller streams which come in over the ridges as torrents and cataracts. Lake Waminikapou, it should be said, is but a section of this valley, forty miles long, which has been dammed up. The loose material too has been cleared out here, the only remains of it seen being a high sand bank on the north side near the outlet.

We had two days clear rowing above the lake and must have covered fifty miles when we again struck rough water. This necessitated tracking again, but at the end of a day the river had become so rough that, after reconnoitering ahead, we concluded we could make better progress on foot; so we made camp there in the spruces on the bank, and in the morning the boat was brought into the woods out of reach of the sun, the stuff stowed snugly away under it, packs made up, and we started off. A blanket bag apiece, one rubber blanket, the camera and compass, a hatchet, a revolver with shot cartridges, and provisions for a week, made up a load for each man of twenty or twenty-five pounds.

The first move was to get somewhere where we could see. A steep climb up over the old beaches brought us for the first time on the Labrador plateau. We could see the river course for some distance above and below, but what was of more account was a bare round-topped mountain some miles to the north, rising clear of any neighboring elevation. This we determined to climb, hoping that from it we might see the mist of the fall; and so, compass in hand, we set out for it, tramping among bushy spruces growing scatteringly out of deep

springy beds of moss. At length we gained the top. No sign of the fall greeted us. We could see the river valley stretching for miles, looking in its contour and regularity like the Colorado cañon. On the opposite side above two branch valleys came in. A large lake lay just to the east of us. Another was shining away off in the north, while ponds of various sizes were scattered over the country in every direction. All the near country was wooded, but off in the northeast a number of bare ridges were seen, and in their neighborhood a fire was raging.

Taking the bearing of important points, we returned to the plain. The night was spent close to the river, and next morning travel was resumed along its shore. A large branch on the opposite side was passed, and dinner taken where a second came into the main stream. Here the river abruptly contracts and turns a right angle, while we were driven on to the plateau by the narrowness and steepness of its gorge.

The next day was the 13th of August. We had been jumping at the work ever since the start, and it had begun to tell severely. The food in our packs was by this time half gone, and, whether or no the falls were reached, it looked as if that day must be the last of our forward march. With the idea then of making that day tell for as much as possible, we quit following the windings of the river, and struck out parallel to its general course; and so for an hour or two, pestered by flies and expecting little, we plodded along rather listlessly. And we had just sighted a hill in the distance and had determined to make for it, when Cole called my attention to a roar coming from the direction of the river. We

XUM

had often heard such sounds on the previous day, and going up could always look down into a great deep gorge, where the river, hundreds of feet beneath, was plunging along in heavy rapids; but this sound was perhaps heavier than others, and the river we knew was a long way off, so we headed up for it and began to travel with more snap and interest. The sound at first held off, but that was a good sign. At length it gradually increased, became greatly heavier, and as we travelled now more hopefully, the roar of a sudden changed character,—it seemed tremendous and close to, and somehow as if it were not muffled up in a cañon—while from away down to the left came a periodical pounding. That put us into a run, and in a minute we caught the flash of white water through the spruces, and, bursting through the fringe of bushes, found ourselves on the shore of a heavy rapid, at our own level, and the falls were smoking and pounding below.

The roar which had attracted us was that of the river running at the plateau level. Where we came out upon it, about a mile above the fall, the river was nearly 200 yards wide, a heavy boiling rapid. Walking down over the great blocks of rock which form the shore, the river is seen to narrow; it becomes rougher too, and makes two or three minor plunges of ten or fifteen feet. Going down to the brink of the main fall, and standing on the ledge beside it, the river is seen coming down from the north, plunging right at you. Just above where you stand, the river gathers itself into a narrow, straight shoot of tremendous velocity and power, which, at first nearly horizontal, curves gradually downward over a similar curve in the jointing of the rock, until, after a

long steep slide, it drops vertically into a basin filled with flying mists. Below the fall the river for half a mile flows east, the abrupt turn at the fall rendering impossible a face view of it from the left bank. The opposite side of the basin is vertical, but the nearer side, while very steep, has seams in it with occasional fringes of bushes, which make it possible for a man to climb down to the level of the river. Mr. Cole scrambled down with our Kodak camera, and took pictures of the fall and gorge which are used in illustration. The writer at the same time was occupied in an attempt to get at the height of the fall. Our sextant was at the boat and the aneroid in the Horseshoe rapid, so an original device was rigged. The theory was good, and the result would doubtless have been tolerably satisfactory had not a couple of the little black flies, which had otherwise done us so much injury, crawled in by the cross-levels in the bottom of my compass and vitiated the sights. The height of the fall was estimated at not over 200 feet, but it has since been determined to be considerably greater. An estimate of the volume of water is very difficult to give. We saw the fall at a time of low water, but the volume then running amounted to a very considerable river, as large, I should say, as the summer volume of any of the rivers of Maine. Tradition about the Inlet has it that the first white men who ever saw the fall were attracted to it by the mist which was seen from a distance of many miles; that when they came nearer the ground shook, and that only the most courageous of the party dared to approach the brink. Little wonder that the Indians avoid, as a supernatural object, such a manifestation of power

For the sake of completeness I shall say here that Mr. Cole walked up stream to a point three or four miles above the fall, and there climbed a tree from which he could see a couple of miles further. The river was a heavy rapid all the way. The elevation climbed the day we left the boat was christened Mt. Hyde. The distant lake seen from its summit, and outlined on the map, was supposed to be Petchikapou, where old Fort Nascopee was located. Plotting our data as best I can, I judge the lake to be not more than fifteen miles from the fall, and in the direction from which the river is flowing.

At the fall begins the structure which we have taken the liberty to name "Bowdoin Cañon." One of the illustrations is a view in its upper end, looking down stream from the foot of the fall. The vertical wall on the opposite side is somewhat higher than the fall. Some four miles below, in a turn to the west, the river has cut into the northern face of a hill, and here again the wall is vertical. The river is very wild meanwhile, and if the fall is 300 feet in height, this cliff cannot be less than 500. On the return we travelled as directly as possible from the head to the foot of the cañon, and estimated the distance at nine miles. One way or the other, nearly the whole length of the cañon was seen. Its course was very winding, with many sharp turns, and I have no hesitation in saying that its entire length is as much as twenty miles. The river occupies the whole width of the bottom, averaging, it is judged, something like 100 yards. For the whole distance it is exceedingly rough, and there are many minor falls and plunges which make the change of level

very rapid. At its foot, therefore, the structure cannot be less than 800 or 1,000 feet deep, while it is probably deeper. It was descended but once, at the head, and so steep are the sides that at but few points throughout its length would descent have been possible.

I have previously described the character of the river valley below. It is, in brief, a trough cut into the plateau, differing from the cañon in being wider, and in having walls much less steep. It is, in short, an older structure. Now the cañon opens into the side of this valley, and at right angles to it. The valley extends straight by, continuous in direction and character, but while, as seems evident, the main drainage of the country once flowed through this channel, it now holds but a small stream compared with the volume pouring out of the cañon. The branch coming in from the west some miles below is much larger, carrying probably one-fourth the volume of the main stream.

Here I shall briefly close my narrative, leaving for the end the task of gathering up a few salient points. One day was spent in the neighborhood of the fall, then we set out on the return. Late in the afternoon of the second day we reached the spot where we had left our boat. A hard sight was before us. Our campfire had hung in the ground, and in the middle of a half-acre of burnt moss and uprooted trees we found the ashes of our outfit. With the nearest cache 150 miles away, this constituted a serious situation; so fishing everything useful out of the fire, and throwing away all unnecessary load, we once more slung on the packs and struck out down river. Progress was made on rafts and afoot. We had a little food to start with.

Trout and berries added something, while the squirrels helped out still more. Fourteen days from the burnt boat the river was behind us, and we turned up at Joseph Michelin's door; and three days later, on September 1st, we met the vessel at Rigolet, and climbed over her sides to a square meal and a hearty welcome. Society, literature, æsthetic pleasures were for us superfluous. Life for the next few weeks was a round of eating and sleep.

One inference drawn from this experience I wish to spread as far as the knowledge of it goes,—and that is the value at such a time of sleep. We carried our blankets through and made it a point every night to build a brush bed, have a camp fire, and take all the comfort possible. This sometimes cost a good deal, but it paid abundantly. It is my judgment that a man, caught in circumstances where strength has to be carefully husbanded, should sacrifice almost anything for the sake of sound sleep.

To sum up the main points, Labrador is a part of the oldest land on the American continent, and its surface is the product of long erosion and of glaciation. This surface in the region under discussion is according to Mr. Holme 2,000 feet above the sea, and, so far as our limited observation goes, it is reduced in the interior to a pretty even general level with perpetual minor elevations and depressions. The Grand River flows in a valley cut deeply into the plateau, a valley shaped for the most part by the action of water and ice. The cañon is a younger structure, and untouched by glaciation. The magnitude of these structures is evident; but when it is remembered that they are formed in the hardest

crystalline rocks, their grandeur and impressiveness are multiplied.

The length of the river from Lake Melville to the fall is thought to be a little less than 300 miles. Points of the compass where mentioned in the text are magnetic.

WHO DISCOVERED THE PYGMIES?

BY

EX-CHIEF JUSTICE DALY,

President of the American Geographical Society.

The Hon. G. Curzon, in giving to the Royal Geographical Society in 1890 the results of his explorations of the Karun River in Southwestern Persia, opened his paper by discharging what he says is "the first duty that a traveller owes—the last, too often, that he thinks of paying—a tribute of acknowledgment to those who have preceded him, and have both assisted and lightened his labors by their own."

Mr. H. M. Stanley, in his recent narrative of his exploration of the unknown portion of equatorial Africa, which he traversed, is a striking example of those who feel no such obligation, and an ordinary reader of his book, who had no previous information upon the subject, would suppose that he was the first to discover the existence of a race of Pygmies in Africa. This is not simply my own conclusion, but I have found such to be the impression of many intelligent persons, who have read "Darkest Africa," with whom I have conversed, and it is the more to be regretted, as what was to be expected of him as an explorer was to compare the race of little people that he found, and of whom he gives such an interesting and valuable account, with what was previously known of the Obongos of Du Chaillu, the Dokos of Krapf, the Kenkob of Koelle, the Akkas

of Schweinfurth, or the earlier accounts of the Matimbos of Battell, and the Wa Berikimos of Boteler.

His making no reference at all to the diminutive people, the Obongos, whom Du Chaillu found living in the forests of Ashango Land in 1865, is the more remarkable, as they are evidently of the same race as the Wambutti that Stanley found, twenty years afterward, further east, along the same equatorial belt of forest.

It is not to be supposed that Mr. Stanley was ignorant of what was previously known respecting this interesting race, for the existence of Pygmies has been mentioned by Homer, Herodotus, Aristotle, Pliny and Pomponius Mela, not individuals of arrested growth, like dwarfs, but as Aristotle puts it, "a race of little men"; all of which authors, with the exception of Homer and Pliny, refer to them as being in Africa north of the equator; and the particular part of it where Aristotle places them is substantially where Dr. Schweinfurth found the Akkas. The information gathered respecting this race of Pygmies in modern times extends as far back as the seventeenth century, in the narrative printed in Purchas' Pilgrimes, in 1625, of the journey of Andrew Battell, who passed three years in Loango, and it has all been collected in an exhaustive paper, published in Petermann's *Mitteilungen* in 1871. This very full account, which fills seventeen double columns of that journal, Stanley may not have seen; but he certainly was familiar with Du Chaillu's journey to Ashango Land, published in 1867, as he is well acquainted with Mr. Du Chaillu, and, as he says, the Pygmies he met with, or as he indiscriminately calls them "dwarfs," were like the Akkas; he appears also to have known of Dr.

Schweinfurth's labors in 1871, and possibly of Emin Pasha's interesting account of the Akkas, communicated to the *Berlin Ethnological Journal* in the year before Stanley's departure.

Du Chaillu is entitled to the distinction of having been the first to find this Pygmy race, living in their native forests and villages, as a distinct people, and to verify by actual knowledge, what substantially had previously been reported and believed respecting this diminutive people.

As the males fled from the villages on Du Chaillu's approach, leaving only a few females and children concealed in the huts, he had great difficulty in gathering the information he did; but by patience, perseverance, and through his kindly disposition, he, in subsequent visits, succeeded in getting an amount of information greater than all that had preceded it, and of the highest value at the time, as it was the result of actual observation. He described their villages, irregularly scattered about; their huts and how they were constructed, so that they could be readily moved from one part of the forest to another; the physical structure of these little people; their color; their hair, in short, curly tufts; the untamable wildness of their eyes; their low, narrow foreheads, and prominent cheek bones; the shortness of their legs in proportion to the length of their bodies; the whiteness of the palms of their hands; their garments of grass cloth; their singular mode of the burial of the dead in the hollows of trees; their expertness in trapping wild animals, in killing elephants, and in fishing; their exchange, after supplying all their own wants, of their surplus for implements, and articles which they got from the Ashangos; the smallness of their com-

munities; the total isolation in which they lived together, and their migratory habit of moving about to different parts of the forest as the game diminished; the fact that they were wholly unlike the Ashangos, near whom they lived, and that the latter disclaimed all kindred with them; that they were wholly a distinct and different people, extending very far to the east, as far, in fact, in the forest as the Ashangos had any knowledge; and he communicated to me, after his return, his belief that these people would be found existing over the whole of the equatorial belt of forest as far as it extended to the east; which the exploration of Stanley, twenty years afterward, confirmed. This, with the measurements he took, to show their uniformly small stature, was the knowledge he communicated of a Pygmy people, extending widely over equatorial Africa, and its novelty at the time may be judged from the fact that the account he published was generally discredited; especially in England, and upon certain occasions publicly, and in a most offensive form. He was not himself aware of the full value of his important discovery until I told him, after reading his account, "You have not only, Mr. Du Chaillu, in your previous journey, found in the gorilla the wild hairy men that the Carthaginian navigator Hanno saw on the west coast of Africa, but you have now, in this last journey, found the Pygmies of Herodotus; two important discoveries with which your name will always hereafter be connected."

The impeachment of Du Chaillu's veracity, which was kept up for several years, and the subsequent vindication of his truthfulness, was widely known at the time to all who took interest in such subjects. Shortly

XUM

after, the missionary, Father Léon des Avanchers. near Kaffa in Abyssinia, was told that little people lived far inland; and in 1871 Dr. Schweinfurth confirmed the existence of the Akkas, of whom Petherick had heard in 1854. M. Quatrefages, the distinguished anthropologist, in his work in 1887 on the Pygmies, says, "It is Schweinfurth who has had the honor to show that the myth of Homer concealed a reality, and to justify the words of Aristotle." It is a well deserved compliment, and it would have been graceful for the French savant also to have acknowledged that our countryman, Du Chaillu, has also had the honor of having been the first to show that the Pygmies, as a distinct, peculiar, and separate people, or race, existed in Africa. The importance and value, however, of his discovery were acknowledged sixteen years previously, at the time when the truthfulness of his statements was still questioned, in the article before referred to in Petermann's *Mitteilungen*, so distinguished for the thoroughness and completeness of the writer's researches, who was probably Petermann himself. After referring to the doubts entertained of Du Chaillu's story, and declaring that there was nothing at all improbable in it, he says, "It is undoubtedly the most valuable contribution to our slight knowledge of the tribes of little men in Central Africa"; and Winwood Reade, in his work upon Africa two years later, refers to Du Chaillu's discovery as "an important contribution to the ethnology of Africa."

It is no small distinction to have discovered this race, who are probably one of the earliest families of mankind. Everything that can be collected respecting them is of great interest, for they must in no long time pass away.

RIVERS AND THE EVOLUTION OF GEOGRAPHIC FORMS.

BY

ALBERT P. BRIGHAM.

The study of Physical Geography in the light of geology is opening our eyes to see a vast group of land forms to which we had before been blind. Given a land surface, gravitation and the sun's heat, and a complex topography must, in time, result. But we are learning to pass from these general causes down to the more special and obscure modes of world-making, and thus to know and reduce to system the resulting structures. It is not too much to say, that they are as interesting, as various, and as capable of classification, as the groups of the animal kingdom. Thus, glaciation has given us, directly or indirectly, many sharply defined types of geographic form. Or, if we take a group of products such as the lakes of a given area, we might have to resort to half a dozen categories to explain the origin of their basins. This variety is well seen in the forms made by the destructive and constructive work of land streams.

In order that we may get before us the relation of river action to geographic forms, I shall ask you to glance at the extent of some of our river systems, and the ceaseless activity of their waters. It will be under-

stood that a river system includes all streams which rise within a given hydrographic basin, and whose waters finally pass by one channel into the ocean reservoir.* The rill and the brook are essential parts of such a system.

A river represents one stage of the water circulation, which is an indispensable part of the organic and inorganic machinery of the globe. The demonstration of the corrosive power of rivers need not concern us here. It has, indeed, been overstated or, at least, thrown out of relation with equally important modes of river action. But let us hold in mind the prodigious activity of such a river system as the Mississippi, with 35,000 miles of navigable waters, and some hundreds of thousands of miles of water current, all told, continuously engaged in making over the physical geography of the central part of the continent.

The combined area of the St. Lawrence and Mississippi basins makes up more than one-fourth of North America; the united territories of the Amazon and La Plata cover more than one-half of South America. The Amazon system has 50,000 miles of navigab e waters. Rivers rise in the interior of continents, and pass, by roughly radial lines, toward the periphery. This is much like affirming that water runs down hill, but it is a fundamental law for our present study. The existence of interior closed basins of considerable extent does not seriously affect our rule. In North America, Minnesota is the region of dispersal for the

* Affluents diverted from the main stream by delta accumulations and finding the sea by new courses, would, it need hardly be said, still be reckoned as a part of the general system.

great streams which reach the Atlantic, the Gulf of Mexico and Hudson Bay. Western central Europe has four streams which rise high up in the mountain gorges of Switzerland and issue in the Black, the North, the Adriatic and the Mediterranean Seas. A small circle on the map covers the sources of the Rhine, the Rhone, the Danube and the Po. The Nile, the Congo and the Zambezi have their beginnings in the high lake region of eastern central Africa. Asia follows the same law, but with great variation in its plan of drainage, while South America is the nearest approach to an exception. The altitude of the Minnesota region is moderate, that of the African lakes about 3,000 feet, while the headwaters of the central European, and some of the Asiatic rivers, dash down the flanks of the highest mountains.

These commonplaces of physical geography lead us to the statement of the most important and interesting principle which has to do with the making of land forms —the law of base level. This affords us a conception which has been most fruitful both for geology and for geography, and which has been developed chiefly by our later American geologists. It is the doctrine that, given time enough, the erosive and transporting forces will degrade a continental mass so nearly to the sea level that the streams will lose their power to carry away the waste of the land. Probably no more than an approximation to such a goal has ever been reached, but such approaches are seen in many old plateaus, once near the sea level, but now elevated and subjected to a new cycle of erosion. We must picture to ourselves the cutting down, and cutting back toward its source, of

every trunk stream. It is the same with every main tributary. New and subordinate affluents continue to come into being, and a system of valleys will result, which is comparable both in form and mode of extension to a tree and its branches. Gradually the headwaters of adjacent streams will cut back through the ridge which divides their basins, and the higher altitudes will slowly yield, the waste being borne to lower levels and finally to the sea. The work will proceed slowly at first, while the river is forming its habit, rapidly during the middle period, and slowly toward the end, of the cycle of degradation. I quote from Professor William Morris Davis a fine description of this final stage of river life:*

"Maturity past, and the power of the river is on the decay. The relief of the land diminishes, for the streams no longer deepen their valleys although the hill tops are degraded; and with the general loss of elevation, there is a failure of rainfall to a certain extent. The slopes of the headwaters decrease and the valley sides widen so far that the land waste descends from them slower than before. Later, what with failure of rainfall and decrease of slope, there is perhaps a return to the early imperfection of drainage, and the number of side streams diminishes as branches fall from a dying tree. The flood-plains of maturity are carried down to the sea, and at last the river settles down to an old age of well-earned rest with gentle flow and light load, little work remaining to be done. The great task that the river entered upon is completed."

* The Rivers and Valleys of Pennsylvania, National Geographic Magazine, Vol. I., No. 3, p. 24.

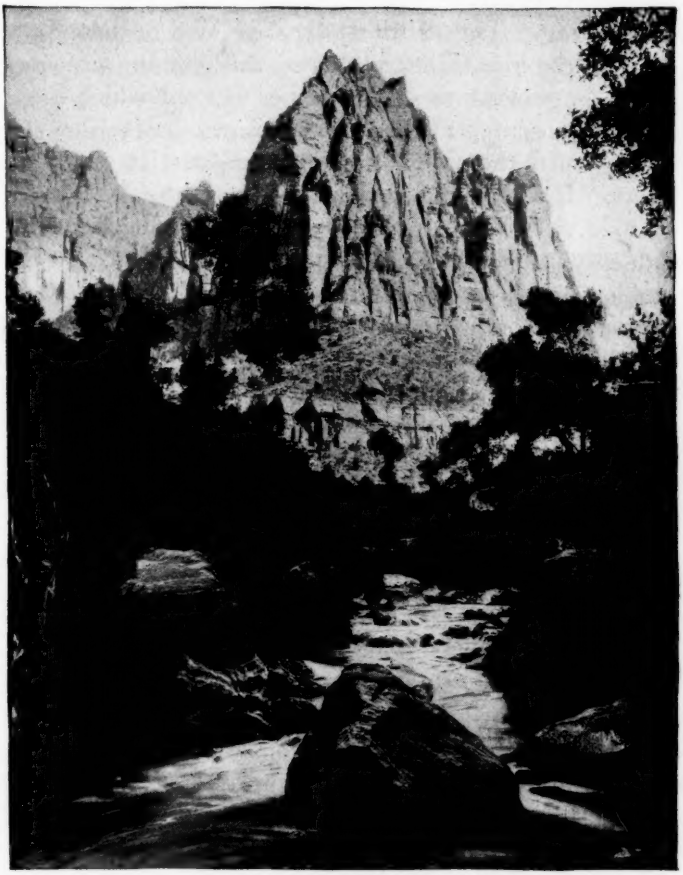
Suppose now, that a river system has just become well established in a given area. We have, therefore, a country of strong relief and diversified scenery. We will follow our imaginary river from its source to its mouth, observing the work which it does and the forms which it creates. These forms may be carved out of solid material, or built up out of loose material. The river, in vertical section, if we eliminate its lateral wanderings and curves, may be rough y represented by a series of straight lines, much inclined at first, but rapidly changing in attitude, until we have a nearly straight and horizontal line near the sea. The upper part of the river is its torrential stage. In its typical form, it will be a rushing stream, cutting a V-shaped gorge, leaping in cascades, clearing out of its course all débris except boulders, and even these surely break up and are borne away. The steep slopes of a hill or mountain region are dissected by a dendritic system of such narrow, steep valleys, leaving an assemblage of peaks and ridges, broad and rounded, or pointed and narrow, according to the age of the streams and the nature of the under structure. Each brook tries to reach back into the mountains just as every twig of a tree tries to grow longer. Rock material loses much of its weight, relatively, in the water, and so the swift currents hurry it toward the sea, grinding it rounder and finer at every stage of the long journey. The river in its torrential stage is a vast saw. It rasps in its bed with unexampled industry. But no corrosion is accomplished by mere water. It is water, under the pull of gravity, using certain effective tools, which saws deep channels into the crust of the earth, and gives us, next

to the mountains, the most impressive of all geographic forms. These tools are boulders and sand. Now if a river be overloaded with such tools, it becomes as powerless to dig as if it had none. Given a stream with rapid fall, and a moderate load of débris, and it is equipped to file down the most obdurate strata.*

We must also recognize another sharp limit to river action. If I have seemed to ascribe the whole of base-levelling work to rivers, let me hasten to disclaim such intention. River work is important enough in geography, without borrowing undeserved honors. A single topographic result is always the product of a network of causes. Rivers do not baselevel a country. Their chief work is not corrosion. Their glory is in their power as patient burden-bearers—the common carriers of continents. A river digs a channel as wide as its water-flow, and no wider. It can carry and never tire; but it must have help in assuming its load. Rocks fall off into streams, but the initial splitting was done by the frost, or by the growth of a twig. All our soils are creeping down the hill sides. Tillage by human hand helps surprisingly to degrade all our agricultural uplands. Every hill side has its land-slip, small or great. Humble vegetable organisms bring decay to rock surfaces. Atmospheric erosion is universal, and underground water is always preparing the rocks for their ultimate journey toward the sea The winds are no small factor in this work, and the burrowing animals should not be left out of account. Every hill, if we learn to think truly of it, is becoming lower and smaller,

* See Chapter on Land Sculpture, Geology of the Henry Mountains, by G. K. Gilbert.

and every valley, whose bottom is near baselevel, is growing wider. The Catskills are but a vast block of



EAGLE CRAG, RIO VIRGEN, UTAH.

River work and general erosion. The stream, though flowing at a torrential rate, cannot wholly remove the débris.

XUM

strata left in their present form by the forces which have etched away the masses about them. The rivers have done relatively little excavating, but a great deal of carrying. The driftless area of Wisconsin offers some of the finest illustrations of this etching process, which, in general, we call weathering, and which is so intimately related to the work of rivers.

I pass to the unloading and constructive work of rivers. If a river slackens its flow, it drops a part of its load. This is a great law. If a torrent descends suddenly into a plain, a vast apron-shaped mass of stony rubbish, sand, mud and drift-wood, will be deposited. Any ravine coming out of a hillside, upon a valley road or field, will give a more or less perfect illustration. It is the structure known as the alluvial cone. If the descent upon the plain is more gradual, the deposition will be more gradual also. Instead of a bouldery channel, we shall begin to find rude terraces of coarse material, and, farther down, we reach the bottom lands, of finer materials, made rich and productive by successive inundations. The river now flows more gently, but is still busily at work. It may cut yet deeper, and gradually form a new flood plain, leaving the remnants of the former one as a pair of terraces on the sides of the valley. Not all terraces are thus formed, but, however made, they are one of the most interesting types of topography. Their lines are approximately straight and parallel, but to the student of earth forms, in spite of their precision, they vie in beauty and interest with the most flowing and graceful contours. I have recently counted a beautiful series of eight distinct benches, rising from the Saxton's River, a

small affluent of the Connecticut, at Bellows Falls, Vermont.*

We pass now into a tract in which the river begins to struggle with its own sediments, and creates the type known as the meander. This feature of rivers is in a general way familiar to all, but is not understood in its full topographic significance for such regions as that of the lower Mississippi. The elaborate set of maps prepared by the Mississippi River Commission affords data for a most interesting and prolonged study of such forms. The number and extent of the lagoon, or cut-off lakes, are very great. All conceivable gradations of marsh and alluvial bottoms, with resultant forms of vegetation, appear on these maps. New lakes formed by recent cut-offs are mingled profusely with those which are a little older and partially silted up at their ends, and with yet others which are entirely, or, it may be, remotely, shut off from the channel. Besides typical lagoons, or ox bows, all sorts of linear, forked and crescentic lakes are found, lakes which may be said to be entrapped by the rapid extension of sediments. When we remember that a single cut-off may shorten the steamer's track by a dozen miles, and that every such change tends to propagate itself down the stream for long distances, we shall see the geographic significance of this mode of river action. One might almost ascribe intelligence to a river, so fertile is it in resources. At least the notion is a useful one,—it helps us to a dynam-

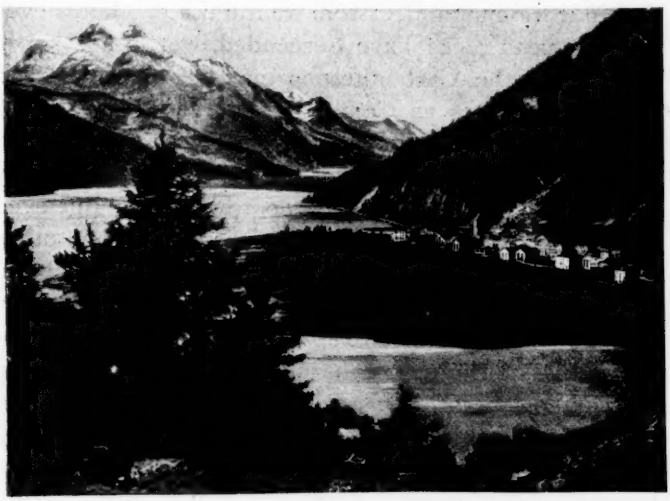
* The writer's indignation was recently stirred by seeing above a fine terrace near Springfield, Mass., a glaring advertising sign. Worse, if possible, is the sign of a Hartford clothing house on one of the loveliest islands in the Connecticut River. Such treatment of nature is worse than vulgar, it is profane, and demands more of protest than it has yet received.

XUM

ic conception of the earth. The geographer and the geologist will never rightly know the world of form, until they begin to feel it as a world of process. We need to track the planet-making forces at their toil, to see with what sure laws and tireless industry they carve out continents into infinitely varied relief, maintaining land and sea as a fit home for living creatures. A grasp of formal facts is scarcely more important than to get a sense of the life which pervades the physical universe, to feel, as a second nature, that the world is never done, but always making. Geographic forms can no more be appreciated apart from geographic evolution, than the morphology of a horse can be well known, apart from its phylogenic and its embryonic history. I do not know anything more suited than the study of a river, to add what I may call the vital factor to our appreciation of form.

We are now in the region of great river inundations. To discuss the complex conditions which determine floods is apart from the present purpose, but they have one important effect on topography, apart from the familiar one of levelling off the ordinary flood plain. As the flood waters pass from the channel, they slacken flow, and drop part of their burden near the stream. The result is that the alluvium is highest next the stream and slopes toward the walls of the valley. The river bed is also lifted by the deposit of sediment, and we have the phenomenon of a river flowing along the summit of a low ridge. To build a levee is only to accentuate the construction of nature. The magnitude of the levee problem on great rivers lies in these broad depressions beyond and below the river banks. The

Mississippi bottoms average forty miles in width from Cairo to the Gulf of Mexico. The slope southward is but eight inches per mile, while the lateral slope toward the foot hills is six inches in 5,000 feet; but this lateral slope is seven feet in the first mile from the river bank, on either side.



SILVAPLANA, ENGADINE, SWITZERLAND.

The river here is swelled to a lake by a barrier. A mountain torrent from the right has nearly bisected the lake by depositing the alluvial cone, on which the village stands.

We are now close to the final, or delta stage of the river. Here the whole hour might be spent with profit. Fortunately we are not restricted to borings or diving, to learn the details of delta structure. A great number of what we may call fossil deltas, or sand plains, lie up high and dry, in our northern regions. They were

formed in the temporary waters of the old ice time, and have since been carefully dissected for our observation. But to return to the deltas of to-day. They mark pre-eminently the deposition stage of the river, and the extension of continental areas. All new land is built out of the waste of old land. This is another great fact in world-making. From what unknown lands even our Archæan rocks have descended, we do not know. Pebbles in the Carboniferous may betray the parentage of the beds as Cambrian, and soon, indefinitely. Material for an area of growing shore line is brought in two ways; by the rivers which pour through it, and by the ocean currents which sweep toward it. But even in the latter case, it is only sediment from some other river. Thus the relatively new land from Cairo south, is the gift of northern areas. An assemblage of erosive forces got the material ready, the river carried it, and the waters of the gulf unharnessed the burden. The land extension within historic time, at the mouth of the Nile, the Po or the Ganges, would afford an interesting field for detailed study. The ancient port of Adria is fourteen miles inland. Rusted rings yet appear in old piers, miles from the sea, at Ravenna. The Po, with the help of glaciers, has brought this world-stuff from the flanks of the Alps and the Apennines, and dumped it into the sea. It will be remembered that tidal rivers, like the Thames or the Amazon, have no deltas. These rivers do their work as faithfully as their delta-making neighbors, their load being carried to other shores, or strewn more widely on ocean floors.

Let us look back for a moment, upon the varying phases of river work. Transportation begins at the

headwaters, and continues, always important, to the ocean. Corrosion is active in the torrential stage, and passes practically down to zero in the lower course of the stream. Deposition begins at the end of the torrential section, and prevails strongly to the ocean. In the middle, or terrace section, the forces approximate an equilibrium. The river lays up its waste in its banks, only to load it up again after months or years, and carry it a stage further toward its destination. Somewhere in descending our stream, we pass the critical point between land destruction and land building. Above this point, materials are gathered up; below, they are strewn down. Above, we have, if we may use the expression, destructive geographic forms; below, constructive forms. Above, it is land sculpture; below it is land modelling. Professor N. S. Shaler has called attention to the fact that one rate of underground flow will enlarge a cavern, while a slightly less rate will occasion the deposit of lime, and seal up the chamber,—one result, or its contrary, by passing a critical point in the rate of a continuous agent.* So in the case of the river. We pass a critical point in the flow, at which degradation becomes secondary and the work of building becomes dominant. Vertical extension of the continental mass passes into horizontal extension. This brings us back to our great law, the law of baselevel. Busy workers encompass the continental heap and rake it down into the sea. We have a home on *terra firma*, because they cannot quite keep pace with the cosmic forces which ever oppose them, and so they must keep

* Aspects of the Earth, by N. S. Shaler, pp. 111–112.

on, sculpturing out the hills which they are ever trying to destroy.

But rivers do not pass, without interruption, such a cycle of history. Many episodes of greatest interest come in, to modify their action, and to determine a wide range of geographic forms. Here again, we emphasize the complexity of geologic forms, and of the resultant topography. Suppose we have a river whose headwaters are frozen. We call such a head stream a glacier, but it is only the river doing its work under peculiar conditions, which, though diverse, are, after all, strangely parallel to the laws of normal river action. And far up the valley, above the frontal ice, the subglacial stream is doing its task in a very river-like way. Other rivers pass into the realm of ice as they enter the sea, and thus the Mackenzie and the great Siberian rivers are subject to clogging and great floods, each varying condition leaving its geographic record.

I can little more than enumerate here the types of fortune to which a river is subject. Geologic understructure is a constant determining factor. Where a river shall go, what kind of a channel it will cut, how much work it will do,—are matters determined, in an infinite number of ways, by the underlying strata. A river flowing on horizontally bedded rocks will tend to have, in its youth, a narrow cañon. The Genesee cañon is as good an example as any; the river is not young, but sections of it have been made young in recent time, and so we see what a juvenile river will do in such geological conditions. Alternations of hard and soft strata give, in early stages of river life, alternations of rock benches and talus slopes; and many terrace-like

horizons on the sides of the valley, mantled commonly by soil, have this origin. Thus a terrace may be built up, or carved out, and it may consist of alluvium, glacial rubbish, or bed rock. Tilted rocks give different types of river valleys in infinite variety. These types may be said to be just now beginning to attract a fair share of the interest of geographers and geologists. They will, in years to come, afford some of the most intricate, as well as most fascinating, problems which are open to inquiry. The memoir on the Rivers and Valleys of Pennsylvania, already noted, may well be consulted by any who are not already familiar with the possible results of such investigation.* I may briefly refer here to an illustration of a simple case of migration. It is the capture, by Deer Run, of the head-waters of Perkiomen Creek, both being small streams in eastern Pennsylvania.† The character of the case makes it possible for even non-scientific observers to look for similar ones, and with probability of being successful in the search.

The literature of river-changes by the last glaciation is too abundant and too familiar to make it needful or proper that I should take time in this essay to enter this wide field; every ice-ridden region is full of such changes. Most northern streams which survived the ice flow far above their ancient beds, upon glacial rubbish, as Dr. J. S. Newberry and others have shown. I have myself specially noted the vast filling of the north and south valleys, which cross the Mohawk-Susquehanna

* Cf. also, The Geographic Development of Northern New Jersey, by William Morris Davis and J. Walter Wood, Jr., Proc. Boston Soc. Nat. Hist., Vol. XXIV., 1889.

† Described by Professor Davis, Science, Vol. XIII., p. 108.

divide in our own state. It is sometimes one hundred feet deep, and probably the depth is often much greater. What ancient streams cut these great troughs, in which flow to-day little streams which carry the drainage of a few farms, or of a township? And how much did glaciers enlarge these valleys, and what story do the valleys hold about the ancient geography of the Ontario-Mohawk region? Our geologists have told us much, but they have as yet told us but a fragment of the genesis of the geography of the Empire State, with its important relations to the history of the St. Lawrence and the Great Lakes.

Returning to glacial changes, I note as of special interest here the new Niagara, the new portions of the Genesee at Portage and Rochester, the West Canada Creek at Trenton, and the Mohawk at Cohoes. The preglacial river, also, in trying to find a new course, has often run upon obdurate spurs of rock, for a time blocking its course. This, and the same often happens in the original excavation of the valley, occasions what have been called subordinate baselevels. The obstruction holds back the water, giving a tract of non-erosion and deposition above, with rapids below. Many such alternations and sharp variations of descent may occur in the course of a stream.

To us, who see chiefly our eastern types of river and valley, the Colorado River of the West presents a group of conditions which is supremely instructive. Here, the important new factor is the aridity of most of the area traversed by the stream, with the abundant supply of head-waters from regions of precipitation at the North. Added to this feature, we have horizontally bedded

rocks, of varying texture, and a high measure of elevation. The result of such conditions is,—high, rocky plateaus, meagre vegetation, and the profound cañons of that region. The descent of the Ohio-Mississippi from Pittsburg to Vicksburg is 699 feet. The descent of the Colorado from the Green River Station of the Union Pacific Railway to its mouth, about the same distance, is 6,000 feet. Observe the conditions for erosion, or general weathering. They are highly unfavorable, the country is too dry. To be sure, there is no mantle of vegetation and soil comparable to that which protects our eastern rocks, but this is not the dominant factor. On the other hand, notice that the corrosive power of the river is at its best with abundant water supply and large fall. Notwithstanding, a stupendous general erosion has been accomplished, stripping off thousands of feet of strata, not more, indeed, than in the Appalachians, but more striking, because visible to every eye in the gloriously colored cliffs of each section of the plateau, remaining to show just how far the work has gone. Nor can the corrosive power of the river have credit, even, for the cañon. It is responsible for its depth, but not for its immense breadth. The river saws its narrow groove, and the dropping of huge blocks and the etching out of those titanic architectural forms that line the walls have made the greater part of the chasm. Here is added emphasis to the principle already insisted on, that the great function of rivers is transportation. We leave the Colorado honor enough, and more than Mr. Prestwich will grant, for he still thinks the cañon must be due to a fissure, although he concedes the lack of evidence. Let me add, that

XUM

Dutton seeks to dispel the common erroneous notion that the cañon is narrow and dark. Its upper walls range from seven to twelve miles apart. The study of the Plateau region, by Powell, Dutton, Gilbert and their assistants, has given us a body of doctrine which aids us at every turn in physiographic research.†

The last interruption of the normal river cycle, which I wish to note, is by oscillation. Here the Hudson is our illustration. Elevate a baselevelled country and the streams renew their life. New rapids and falls are formed, and a diverse topography is again developed. Thus when the Hudson found the Atlantic eighty miles to the southeast of New York harbor, it was cutting out the rock channel between New York and Jersey City, a channel now far beneath the deposit of loose stuff laid down since the country was submerged in part, and the waters of the Atlantic drowned the Hudson. Lift the country again, and you can dispense with dredging, and the great river boats will ply their trade no more. The streams of New England are now engaged in dissecting the old baselevel, which has been hoisted up from the sea. But the Hudson valley has also been more depressed than it is to-day, in that glacial or post-glacial time when the valleys of this great estuary were filled with the clays, which now rise one hundred feet and more above the stream. It might be a difficult matter to determine whether the streams, or the brick-makers, are working the more effectively to cut away these clays.

† See Geology of Uinta Mountains, and Exploration of the Colorado River of the West, by J. W. Powell; Geology of the Henry Mountains, by G. K. Gilbert; Geology of the High Plateaus of Utah and Tertiary History of the Grand Cañon District, by C. E. Dutton. The last work, pp. 230-260, gives an especially useful discussion of the conditions of erosion found in the Plateau region.

The lifting of a limited area of the earth's crust, as in mountain folding, affords a different problem, or a different aspect of the same problem, if we think of continental and mountain elevation as going on together. Here the question is, whether the river can saw down as fast as earth stresses can lift up. If the river is the winner, we call it, after Powell, an antecedent river. If the folding outdoes the river, a new channel gathers the drainage and we have a consequent river. The antecedent river finds its type in that vigorous stream which has crossed and slit in two a portion of the Uinta Mountains.

I have been able only to touch, here and there, one of the greatest of geographic themes. The river is profoundly and beautifully related to the morphology of continents. Its distinctive work is transportation; and, with its attendant forces, it destroys the old land and builds the new, rejuvenating the planet, making the most beautiful scenery, depositing the richest soil, and carrying to an uncounted company of marine organisms their daily food.

The Oriental is perhaps the most unscientific of human kind. Do not understand me to attribute a scientific formula to him; I only give him credit for seeing what the desert streams did, every day, as he looked upon them. They have done the same for centuries since his day, as they had done the same for æons before his time. I quote from an old Hebrew poem:

> **And surely the mountain falling cometh to naught,**
> **And the rock is removed out of its place,**
> **The waters wear the stones,**
> **The overflowings thereof wash away the dust of the earth.**

We can hardly improve upon the observation, though

we should be apt to drop the poetic dress, and say that the country was working down toward a baselevel. If we turn to social and economic geography, we cannot overstate the significance of rivers, whether we watch the angry, dashing torrent which comes down the mountain, lifting its roar, and flashing its spray in the face of the sun, or whether we go down through broad valleys and stand on the banks of

The great rivers which move like God's eternity.

Never twice the same, the river, by day and by night, fills its place in the economy of the world. The landscape, with its delight for the eye, its thought of peace, or emotion of sublimity, has everywhere felt the moulding power of the river.

Rivers are the determining forces of civilization. Discovery, agriculture, arts and commerce march up the track of rivers as unerringly as the waters meet them in passing to the sea. The American continent swung open its gates at the Mississippi and the James, the Hudson and the St. Lawrence. The best land in the world is the alluvium of rivers,—the Mohawk flats, the Mississippi valley, the Connecticut bottoms, the Netherlands and the Nile, suggesting Emerson's farmers, who

Thank the spring flood for its fertile slime.

The Hudson, the Mississippi, the Thames and the Amazon are the greatest of all highways. Lines of railway seek the grades already surveyed and levelled by streams. All water power is in the cosmic force of gravity, as it pulls the rainwater from the land heights to the sea. Most inland cities are determined by rivers. Albany and its attendant cluster of cities are the gift

of the Hudson. Dr. Newberry reminds us that all the salt wells of Syracuse are sunk in the gravel of a buried channel. Thus an old pre-glacial river laid the foundation of Syracuse. Rochester grew up over a river, and on the brink of a cataract. St. Paul, Minneapolis, Philadelphia, Baltimore, Washington, Richmond and New York, each in its way, tell the same story. Not the ocean, but the Hudson River and the Mohawk Valley made New York the metropolis of the New World.

One need not go far to study rivers. Any rill will serve well. The brook and the Mississippi behave alike. The road side will show you cañons, and the little stream is on the way to the sea with its load. It has its meanders, its terraces, its sandbars and deltas. Know the brook, and you will know the river. He who knows the river will have a new appreciation of the use, the beauty and the glory of nature.

XUM

U. S. ATLAS SHEETS AND CENSUS BULLETINS.

December 31, 1891.

The following list, prepared under great difficulties, enumerates all the Topographical Atlas Sheets, published by the U. S. Geological Survey, from the beginning of the work to June 30, 1890. It precedes in order of time and completes the list printed in the BULLETIN of Sept. 30, 1891, pp. 432–444.

I have added the numbers and titles of the census bulletins, giving, so far as ascertained, the results of the U. S. census of 1890.

J. H. HICKCOX.

ALABAMA.

(See also Georgia and Alabama.)

ANNISTON. Scale 1:125,000; contour interval 100 ft. Latitude of southern border 33° 30′; longitude of eastern border 85° 30′.

BESSEMER. Scale 1:125,000; contour interval 100 ft. Latitude of southern border 33° 0′; longitude of eastern border 86° 30′.

BIRMINGHAM. Scale 1:125,000; contour interval 100 ft. Latitude of southern border 33° 30′; longitude of eastern border 86° 30′.

CULLMAN. Scale 1:125,000; contour interval 100 ft. Latitude of southern border 34° 0′; longitude of eastern border 86° 30′.

FORT PAYNE. Scale 1:125,000; contour interval 100 ft. Latitude of southern border 34° 0′; longitude of eastern border 85° 30′.

GADSDEN. Scale 1:125,000; contour interval 100 ft. Latitude of southern border 34° 0′; longitude of eastern border 86° 0′.

HUNTSVILLE. Scale 1:125,000; contour interval 100 ft. Latitude of southern border 34° 30′; longitude of eastern border 86° 30′.

SCOTTSBORO. Scale 1:125,000; contour interval 100 ft. Latitude of southern border 34° 30′; longitude of eastern border 86° 0′.

SPRINGVILLE. Scale 1:125,000; contour interval 100 ft. Latitude of southern border 33° 30′; longitude of eastern border 86° 0′.

STEVENSON. Scale 1:125,000; contour interval 100 ft. Latitude of southern border 34° 30′; longitude of eastern border 85° 30′.

TALLADEGA. Scale 1:125,000; contour interval 100 ft. Latitude of southern border 33° 0′; longitude of eastern border 86° 0′.

ARIZONA.

(See also New Mexico and Arizona.)

CHINO. Scale 1:250,000; contour interval 250 ft. Latitude of southern border 35° 0′; longitude of eastern border 112° 0′.

DIAMOND CREEK. Scale 1:250,000; contour interval 250 ft. Latitude of southern border 35° 0′; longitude of eastern border 113° 0′.

ECHO CLIFFS. Scale 1:250,000; contour interval 250 ft. Latitude of southern border 36° 0′; longitude of eastern border 111° 0′.

HOLBROOK. Scale 1:250,000; contour interval 200 ft. Latitude of southern border 34° 0′; longitude of eastern border 110° 0′.

KAIBAL. Scale 1:250,000; contour interval 250 ft. Lati-

tude of southern border 36° 0′, longitude of eastern border 112° 0′.

MARSH PASS. Scale 1:250,000; contour interval 200 ft. Latitude of southern border 36° 0′; longitude of eastern border 110° 0′.

MOUNT TRUMBULL. Scale 1:250,000; contour interval 250 ft. Latitude of southern border 36° 0′; longitude of eastern border 113° 0′.

PRESCOTT. Scale 1:250,000; contour interval 200 ft. Latitude of southern border 34° 0′; longitude of eastern border 112° 0′.

SAN FRANCISCO MOUNTAIN. Scale 1:250,000; contour interval 250 ft. Latitude of southern border 35° 0′; longitude of eastern border 111° 0′.

TUSAYAN. Scale 1:250,000; contour interval 200 ft. Latitude of southern border 35° 0′; longitude of eastern border 110° 0′.

VERDE. Scale 1:250,000; contour interval 200 ft. Latitude of southern border 34° 0′; longitude of eastern border 111° 0′.

ARIZONA AND NEVADA.

ST. THOMAS. Scale 1:250,000; contour interval 250 ft. Latitude of southern border 36° 0′; longitude of eastern border 114° 0′.

ARIZONA, NEVADA AND CALIFORNIA.

CAMP MOHAVE. Scale 1:250,000; contour interval 250 ft. Latitude of southern border 35° 0′; longitude of eastern border 114° 0′.

ARKANSAS.

APLIN. Scale 1:62,500: contour interval 20 ft. Lati-

tude of southern border 35° 15′; longitude of eastern border 93° 0′.

ARBUCKLE. Scale 1:62,500; contour interval 20 ft. Latitude of southern border 35° 15′; longitude of eastern border 94° 0′.

ATKINS. Scale 1:62,500; contour interval 20 ft. Latitude of southern border 35° 0′; longitude of eastern border 92° 45′.

BENTON. Scale 1:125,000; contour interval 50 ft. Latitude of southern border 34° 30′; longitude of eastern border 92° 30′.

CLARKSVILLE. Scale 1:62,500; contour interval 20 ft. Latitude of southern border 35° 15′; longitude of eastern border 93° 15′.

COAL HILL. Scale 1:62,500; contour interval 20 ft. Latitude of southern border 35° 15′; longitude of eastern border 93° 30′.

DANVILLE. Scale 1:62,500; contour interval 20 ft. Latitude of southern border 35° 0′; longitude of eastern border 93° 15′.

DARDANELLE. Scale 1:125,000; contour interval 50 ft. Latitude of southern border 35° 0′; longitude of eastern border 93° 0′.

FORT SMITH. Scale 1:125,000; contour interval 50 ft. Latitude of southern border 35° 0′; longitude of eastern border 94° 0′.

GREENWOOD. Scale 1:62,500; contour interval 20 ft. Latitude of southern border 35° 0′; longitude of eastern border 94° 15′.

HOT SPRINGS. Scale 1:125,000; contour interval 50 ft. Latitude of southern border 34° 30′; longitude of eastern border 93° 0′.

XUM

OAK MOUNTAIN. Scale 1:62,500; contour interval 20 ft. Latitude of southern border 35° 15′; longitude of eastern border 92° 45′.

OZARK. Scale 1:62,500; contour interval 20 ft. Latitude of southern border 35° 15′; longitude of eastern border 93° 45′.

PETIT JEAN. Scale 1:62,500; contour interval 20 ft. Latitude of southern border 35° 0′; longitude of eastern border 92° 45′.

POTEAU MOUNTAIN. Scale 1:125,000; contour interval 50 ft. Latitude of southern border 34° 30′; longitude of eastern border 94° 0′.

RUSSELLVILLE. Scale 1:62,500; contour interval 20 ft. Latitude of southern border 35° 15′; longitude of eastern border 93° 0′.

VAN BUREN. Scale 1:62,500; contour interval 20 ft. Latitude of southern border 35° 15′; longitude of eastern border 94° 15′.

CALIFORNIA.

(See also Arizona, Nevada and California.)

ALTURAS. Scale 1:250,000; contour interval 200 ft. Latitude of southern border 41° 0′; longitude of eastern border 120° 0′.

BIDWELL BAR. Scale 1:125,000; contour interval 50 ft. Latitude of southern border 39° 30′; longitude of eastern border 121° 0′.

CHICO. Scale 1:125,000; contour interval 100 ft. Latitude of southern border 39° 30′; longitude of eastern border 121° 30′.

DOWNIEVILLE. Scale 1:125,000; contour interval 50 ft.

Latitude of southern border 39° 30′; longitude of eastern border 120° 30′.

HONEY LAKE. Scale 1:125,000; contour interval 50 ft. Latitude of southern border 40° 0′; longitude of eastern border 120° 0′.

JACKSON. Scale 1:125,000; contour interval 100 ft. Latitude of southern border 38° 0′; longitude of eastern border 120° 30′.

LASSEN PEAK. Scale 1:250,000; contour interval 200 ft. Latitude of southern border 40° 0′; longitude of eastern border 121° 0′.

MARYSVILLE. Scale 1:125,000; contour interval 100 ft. Latitude of southern border 39° 0′; longitude of eastern border 121° 30′.

MODOC LAVA BED. Scale 1:250,000; contour interval 200 ft. Latitude of southern border 41° 0′; longitude of eastern border 121° 0′.

NEVADA CITY. Scale 1:125,000; contour interval 100 ft. Latitude of southern border 39° 0′; longitude of eastern border 121° 0′.

RED BLUFF. Scale 1:250,000; contour interval 200 ft. Latitude of southern border 40° 0′; longitude of eastern border 122° 0′.

SACRAMENTO. Scale 1:125,000; contour interval 100 ft. Latitude of southern border 38° 30′; longitude of eastern border 121° 0′.

SHASTA. Scale 1:250,000; contour interval 200 ft. Latitude of southern border 41° 0′; longitude of eastern border 122° 0′.

COLORADO.

ANTHRACITE. Scale 1:62,500; contour interval 50 ft.

Latitude of southern border 38° 45′; longitude of eastern border 107° 0′.

CRESTED BUTTE. Scale 1:62,500; contour interval 50 ft. Latitude of southern border 38° 45′; longitude of eastern border 106° 45′.

EAST DENVER. Scale 1:125,000; contour interval 50 ft. Latitude of southern border 39° 30′; longitude of eastern border 104° 30′.

COLORADO AND UTAH.

ABAJO. Scale 1:250,000; contour interval 250 ft. Latitude of southern border 37° 0′; longitude of eastern border 109° 0′.

ASHLEY. Scale 1:250,000; contour interval 250 ft. Latitude of southern border 40° 0′; longitude of eastern border 109° 0′.

EAST TAVAPUTS. Scale 1:250,000; contour interval 250 ft. Latitude of southern border 39° 0′; longitude of eastern border 109° 0′.

LA SAL. Scale 1:250,000; contour interval 250 ft. Latitude of southern border 38° 0′; longitude of eastern border 109° 0′.

CONNECTICUT.

(See also Massachusetts, also Massachusetts, Connecticut and New York, also Rhode Island and Connecticut, also Rhode Island, Connecticut and New York, also New York and Connecticut.)

DELAWARE.

(See New Jersey and Delaware.)

DISTRICT OF COLUMBIA.

(See Maryland and District of Columbia, also Maryland, District of Columbia and Virginia.)

GEORGIA.

(See also South Carolina and Georgia.)

CARTERSVILLE. Scale 1:125,000; contour interval 100 ft. Latitude of southern border 34° 0′; longitude of eastern border 84° 30′.

DAHLONEGA. Scale 1:125,000; contour interval 100 ft. Latitude of southern border 34° 30′; longitude of eastern border 83° 30′.

DALTON. Scale 1:125,000; contour interval 100 ft. Latitude of southern border 34° 30′; longitude of eastern border 84° 30′.

ELLIJAY. Scale 1:125,000; contour interval 100 ft. Latitude of southern border 34° 30′; longitude of eastern border 84° 0′.

MARIETTA. Scale 1:125,000; contour interval 50 ft. Latitude of southern border 33° 30′; longitude of eastern border 84° 30′.

SUWANEE. Scale 1:125,000; contour interval 100 ft. Latitude of southern border 34° 0′; longitude of eastern border 84° 0′.

ILLINOIS.

(See also Missouri and Illinois.)

IOWA.

AMANA. Scale 1:62,500; contour interval 20 ft. Latitude of southern border 41° 45′; longitude of eastern border 91° 45′.

ANAMOSA. Scale 1:62,500; contour interval 20 ft. Latitude of southern border 42° 0′; longitude of eastern border 91° 15′.

IOWA CITY. Scale 1:62,500; contour interval 20 ft.

Latitude of southern border 41° 30′; longitude of eastern border 91° 30′.

MARION. Scale 1:62,500; contour interval 20 ft. Latitude of southern border 42° 0′; longitude of eastern border 91° 30′.

MECHANICSVILLE. Scale 1:62,500; contour interval 20 ft. Latitude of southern border 42° 0′; longitude of eastern border 91° 15′.

OXFORD. Scale 1:62,500; coutour interval 20 ft. Latitude of southern border 41° 30′; longitude of eastern border 91° 45′.

SHELLSBURY. Scale 1:62,500; contour interval 20 ft. Latitude of southern border 42° 0′; longitude of eastern border 91° 45′.

WEST LIBERTY. Scale 1:62,500; contour interval 20 ft. Latitude of southern border 41° 30′; longitude of eastern border 91° 15′.

KANSAS.

(See also Missouri and Kansas.)

ABILENE. Scale 1:125,000; contour interval 50 ft. Latitude of southern border 38° 30′; longitude of eastern border 97° 0′.

BURDEN. Scale 1:125,000; contour interval 50 ft. Latitude of southern border 37° 0′; longitude of eastern border 96° 30′.

BURLINGAME. Scale 1:125,000; contour interval 50 ft. Latitude of southern border 38° 30′; longitude of eastern border 95° 30′.

BURLINGTON. Scale 1:125,000; contour interval 50 ft. Latitude of southern border 38° 0′; longitude of eastern border 95° 30′.

COTTONWOOD FALLS. Scale 1:125,000; contour interval 50 ft. Latitude of southern border 38° 0′; longitude of eastern border 96° 30′.

ELDORADO. Scale 1:125,000; contour interval 50 ft. Latitude of southern border 37° 30′; longitude of eastern border 96° 30′.

EMPORIA. Scale 1:125,000; contour interval 50 ft. Latitude of southern border 38° 0′; longitude of eastern border 96° 0′.

ESKRIDGE. Scale 1:125,000; contour interval 50 ft. Latitude of southern border 38° 30′; longitude of eastern border 96° 0′.

EUREKA. Scale 1:125,000; contour interval 50 ft. Latitude of southern border 37° 30′; longitude of eastern border 96° 0′.

FREDONIA. Scale 1:125,000; contour interval 50 ft. Latitude of southern border 37° 30′; longitude of eastern border 95° 30′.

GARNETT. Scale 1:125,000; contour interval 50 ft. Latitude of southern border 38° 0′; longitude of eastern border 95° 0′.

HIAWATHA. Scale 1:125,000; contour interval 50 ft. Latitude of southern border 39° 30′; longitude of eastern border 95° 30′.

INDEPENDENCE. Scale 1:125,000; contour interval 50 ft. Latitude of southern border 37° 0′; longitude of eastern border 95° 30′.

IOLA. Scale 1:125,000; contour interval 50 ft. Latitude of southern border 37° 30′; longitude of eastern border 95° 0′.

JUNCTION CITY. Scale 1:125,000; contour interval 50

XUM

ft. Latitude of southern border 39° 0′ : longitude of eastern border 96° 30′.

LAWRENCE. Scale 1:125,000; contour interval 50 ft. Latitude of southern border 38° 30′; longitude of eastern border 95° 0′.

MARYSVILLE. Scale 1:125,000; contour interval 50 ft. Latitude of southern border 39° 30′; longitude of eastern border 96° 30′.

NEWTON. Scale 1:125,000; contour interval 50 ft. Latitude of southern border 38° 0′; longitude of eastern border 97° 0′.

OSKALOOSA. Scale 1:125,000; contour interval 50 ft. Latitude of southern border 39° 0′; longitude of eastern border 95° 0′.

PARKERVILLE. Scale 1:125,000; contour interval 50 ft. Latitude of southern border 38° 30′; longitude of eastern border 96° 30′.

PARSONS. Scale 1:125,000; contour interval 50 ft. Latitude of southern border 37° 0′; longitude of eastern border 95° 0′.

SEDAN. Scale 1:125,000; contour interval 50 ft. Latitude of southern border 37° 0′; longitude of eastern border 96° 0′.

SENECA. Scale 1:125,000; contour interval 50 ft. Latitude of southern border 39° 30′; longitude of eastern border 96° 0′.

TOPEKA. Scale 1:125,000; contour interval 50 ft. Latitude of southern border 39° 0′; longitude of eastern border 95° 30′.

WAMEGO. Scale 1:125,000; contour interval 50 ft. Latitude of southern border 39° 0′; longitude of eastern border 96° 0′.

WELLINGTON. Scale 1:125,000; contour interval 50 ft. Latitude of southern border 37° 0′; longitude of eastern border 97° 0′.

WICHITA. Scale 1:125,000; contour interval 50 ft. Latitude of southern border 37° 30′; longitude of eastern border 97° 0′.

KENTUCKY.

(See also West Virginia, Virginia and Kentucky.)

PRESTONBURG. Scale 1:125,000; contour interval 100 ft. Latitude of southern border 37° 30′; longitude of eastern border 82° 30′.

KENTUCKY AND VIRGINIA.

GRUNDY. Scale 1:125,000; contour interval 100 ft. Latitude of southern border 37° 0′; longitude of eastern border 82° 0′.

KENTUCKY AND TENNESSEE.

WILLIAMSBURG. Scale 1:125,000; contour interval 100 ft. Latitude of southern border 36° 30′; longitude of eastern border 84° 0′.

KENTUCKY, VIRGINIA AND TENNESSEE.

CUMBERLAND GAP. Scale 1:125,000; contour interval 100 ft. Latitude of southern border 36° 30′; longitude of eastern border 83° 30′.

ESTILLVILLE. Scale 1:125,000; contour interval 100 ft. Latitude of southern border 36° 30′; longitude of eastern border 82° 30′.

JONESVILLE. Scale 1:125,000; contour interval 100 ft. Latitude of southern border 36° 30′; longitude of eastern border 83° 0′.

XUM

MARYLAND.

BALTIMORE. Scale 1:62,500; contour interval 20 ft. Latitude of southern border 38° 10′; longitude of eastern border 76° 30′.

MARYLAND AND DISTRICT OF COLUMBIA.

EAST WASHINGTON. Scale 1:62,500; contour interval 20 ft. Latitude of southern border 38° 45′; longitude of eastern border 76° 45′.

MARYLAND, DISTRICT OF COLUMBIA AND VIRGINIA.

WEST WASHINGTON. Scale 1:62,500; contour interval 20 ft. Latitude of southern border 38° 45′; longitude of eastern border 77° 0′.

MOUNT VERNON. Scale 1:125,000; contour interval 50 ft. Latitude of southern border 38° 30′; longitude of eastern border 77° 0′.

MARYLAND, VIRGINIA AND WEST VIRGINIA.

HARPER'S FERRY. Scale 1:125,000; contour interval 100 ft. Latitude of southern border 39° 0′; longitude of eastern border 77° 30′.

ROMNEY. Scale 1:125,000; contour interval 100 ft. Latitude of southern border 39° 0′; longitude of eastern border 78° 30′.

MARYLAND AND WEST VIRGINIA.

PIEDMONT. Scale 1:125,000; contour interval 100 ft. Latitude of southern border 39° 0′; longitude of eastern border 79° 0′.

MARYLAND AND VIRGINIA.

FREDERICK. Scale 1:125,000; contour interval 50 ft.

Latitude of southern border 39° 0′; longitude of eastern border 77° 0′.

FREDERICKSBURG. Scale 1:125,000; contour interval 50 ft. Latitude of southern border 38° 0′; longitude of eastern border 77° 0′.

MASSACHUSETTS.

ABINGTON. Scale 1:62,500; contour interval 20 ft. Latitude of southern border 42° 0′; longitude of eastern border 70° 45′.

BARNSTABLE. Scale 1:62,500; contour interval 20 ft. Latitude of southern border 41° 32′; longitude of eastern border 70° 15′.

BARRE. Scale 1:62,500; contour interval 20 ft. Latitude of southern border 42° 15′; longitude of eastern border 72° 0′.

BECKET. Scale 1:62,500; contour interval 20 ft. Latitude of southern border 42° 15′; longitude of eastern border 73° 0′.

BELCHERTOWN. Scale 1:62,500; contour interval 20 ft. Latitude of southern border 42° 15′; longitude of eastern border 72° 15′.

BOSTON. Scale 1:62,500; contour interval 20 ft. Latitude of southern border 42° 15′; longitude of eastern border 71° 0′.

BOSTON BAY. Scale 1:62,500; contour interval 20 ft. Latitude of southern border 42° 15′; longitude of eastern border 70° 45′.

CHATHAM. Scale 1:62,500; contour interval 20 ft. Latitude of southern border 41° 30′; longitude of eastern border 69° 45′.

CHESTERFIELD. Scale 1:62,500; contour interval 20 ft.

Latitude of southern border 42° 15′; longitude of eastern border 72° 45′.

DEDHAM. Scale 1:62,500; contour interval 20 ft. Latitude of southern border 42° 0′; longitude of eastern border 71° 0′.

DUXBURY. Scale 1:62,500; contour interval 20 ft. Latitude of southern border 42° 0′; longitude of eastern border 70° 30′.

FALMOUTH. Scale 1:62,500; contour interval 20 ft. Latitude of southern border 41° 30′; longitude of eastern border 70° 30′.

FRAMINGHAM. Scale 1:62,500; contour interval 20 ft. Latitude of southern border 42° 15′; longitude of eastern border 71° 15′.

GAY HEAD. Scale 1:62,500; contour interval 20 ft. Latitude of southern border 41° 15′; longitude of eastern border 70° 42′.

GLOUCESTER. Scale 1:62,500; contour interval 20 ft. Latitude of southern border 42° 30′; longitude of eastern border 70° 30′.

MARLBOROUGH. Scale 1:62,500; contour interval 20 ft. Latitude of southern border 42° 15′; longitude of eastern border 71° 30′.

MARTHA'S VINEYARD. Scale 1:62,500; contour interval 20 ft. Latitude of southern border 41° 15′; longitude of eastern border 70° 27′.

MIDDLEBOROUGH. Scale 1:62,500; contour interval 20 ft. Latitude of southern border 41° 45′; longitude of eastern border 70° 45′.

MUSKEGET. Scale 1:62,500; contour interval 20 ft. Latitude of southern border 41° 15′; longitude of eastern border 70° 12′.

NANTUCKET. Scale 1:62,500; contour interval 20 ft. Latitude of southern border 41° 13′; longitude of eastern border 69° 57′.

NEW BEDFORD. Scale 1:62,500; contour interval 20 ft. Latitude of southern border 41° 30′; longitude of eastern border 70° 45′.

NORTHAMPTON. Scale 1:62,500; contour interval 20 ft. Latitude of southern border 42° 15′; longitude of eastern border 72° 30′.

MASSACHUSETTS AND NEW HAMPSHIRE.

FITCHBURG. Scale 1:62,500; contour interval 20 ft. Latitude of southern border 42° 30′; longitude of eastern border 71° 45′.

GROTON. Scale 1:62,500; contour interval 20 ft. Latitude of southern border 42° 30′; longitude of eastern border 71° 30′.

HAVERHILL. Scale 1:62,500; contour interval 20 ft. Latitude of southern border 42° 45′; longitude of eastern border 71° 0′.

LAWRENCE. Scale 1:62,500; contour interval 20 ft. Latitude of southern border 42° 30′; longitude of eastern border 71° 0′.

LOWELL. Scale 1:62,500; contour interval 20 ft. Latitude of southern border 42° 30′; longitude of eastern border 71° 15′.

NEWBURYPORT. Scale 1:62,500; contour interval 20 ft. Latitude of southern border 42° 45′; longitude of eastern border 70° 45′.

WINCHENDEN. Scale 1:62,500; contour interval 20 ft. Latitude of southern border 42° 30′; longitude of eastern border 72° 0′.

MASSACHUSETTS, NEW HAMPSHIRE AND VERMONT.

WARWICK. Scale 1:62,500; contour interval 20 ft. Latitude of southern border 42° 30′; longitude of eastern border 72° 15′.

MASSACHUSETTS AND VERMONT.

GREENFIELD. Scale 1:62,500; contour interval 20 ft. Latitude of southern border 42° 30′; longitude of eastern border 72° 30′.

GREYLOCK. Scale 1:62,500; contour interval 40 ft. Latitude of southern border 42° 30′; longitude of eastern border 73° 0′.

HAWLEY. Scale 1:62,500; contour interval 20 ft. Latitude of southern border 42° 30′; longitude of eastern border 72° 45′.

MASSACHUSETTS, VERMONT AND NEW YORK.

BERLIN. Scale 1:62,500; contour interval 20 ft. Latitude of southern border 42° 30′; longitude of eastern border 73° 15′.

MASSACHUSETTS AND NEW YORK.

PITTSFIELD. Scale 1:62,500; contour interval 20 ft. Latitude of southern border 42° 15′; longitude of eastern border 73° 15′.

MASSACHUSETTS AND CONNECTICUT.

BROOKFIELD. Scale 1:62,500; contour interval 20 ft. Latitude of southern border 42° 0′; longitude of eastern border 72° 0′.

GRANVILLE. Scale 1:62,500; contour interval 20 ft.

Latitude of southern border 42° 0′; longitude of eastern border 72° 45′.

PALMER. Scale 1:62,500; contour interval 20 ft. Latitude of southern border 40° 0′; longitude of eastern border 72° 15′.

SANDISFIELD. Scale 1:62,500; contour interval 20 ft. Latitude of southern border 42° 0′; longitude of eastern border 73° 0′.

SPRINGFIELD. Scale 1:62,500; contour interval 20 ft. Latitude of southern border 42° 0′; longitude of eastern border 72° 30′.

WEBSTER. Scale 1:62,500; contour interval 20 ft. Latitude of southern border 42° 0′; longitude of eastern border 71° 45′.

MASSACHUSETTS, CONNECTICUT AND NEW YORK.

SHEFFIELD. Scale 1:62,500; contour interval 20 ft. Latitude of southern border 40° 0′; longitude of eastern border 73° 15′.

MASSACHUSETTS AND RHODE ISLAND.

BLACKSTONE. Scale 1:62,500; contour interval 20 ft. Latitude of southern border 42° 0′; longitude of eastern border 71° 30′.

FALL RIVER. Scale 1:62,500; contour interval 20 ft. Latitude of southern border 41° 30′; longitude of eastern border 71° 0′.

FRANKLIN. Scale 1:62,500; contour interval 20 ft. Latitude of southern border 42° 0′; longitude of eastern border 71° 15′.

PROVIDENCE. Scale 1:62,500; contour interval 20 ft.

Latitude of southern border 41° 45′; longitude of eastern border 71° 15′.

MISSOURI.

BOLIVAR. Scale 1:125,000; contour interval 50 ft. Latitude of southern border 37° 30′; longitude of eastern border 93° 0′.

BOONVILLE. Scale 1:125,000; contour interval 50 ft. Latitude of southern border 38° 30′; longitude of eastern border 92° 30′.

BUTLER. Scale 1:125,000; contour interval 50 ft. Latitude of southern border 38° 0′; longitude of eastern border 94° 0′.

CARTHAGE. Scale 1:125,000; contour interval 50 ft. Latitude of southern border 37° 0′; longitude of eastern border 94° 0′.

CLINTON. Scale 1:125,000; contour interval 50 ft. Latitude of southern border 38° 0′; longitude of eastern border 93° 30′.

FULTON. Scale 1:125,000; contour interval 50 ft. Latitude of southern border 38° 30′; longitude of eastern border 91° 30′.

GLASGOW. Scale 1:125,000; contour interval 50 ft. Latitude of southern border 39° 0′; longitude of eastern border 92° 30′.

GREENFIELD. Scale 1:125,000; contour interval 50 ft. Latitude of southern border 37° 0′; longitude of eastern border 93° 30′.

HARRISONVILLE. Scale 1:125,000; contour interval 50 ft. Latitude of southern border 38° 30′; longitude of eastern border 94° 0′.

HERMANN. Scale 1:125,000; contour interval 50 ft.

Latitude of southern border 38° 30′; longitude of eastern border 91° 0′.

INDEPENDENCE. Scale 1:125,000; contour interval 50 ft. Latitude of southern border 39° 0′; longitude of eastern border 94° 0′.

JEFFERSON CITY. Scale 1:125,000; contour interval 50 ft. Latitude of southern border 38° 30′; longitude of eastern border 92° 0′.

LEXINGTON. Scale 1:125,000; contour interval 50 ft. Latitude of southern border 39° 0′; longitude of eastern border 93° 30′.

MARSHALL. Scale 1:125,000; contour interval 50 ft. Latitude of southern border 39° 0′; longitude of eastern border 93° 0′.

MEXICO. Scale 1:125,000; contour interval 50 ft. Latitude of southern border 39° 0′; longitude of eastern border 91° 30′.

MOBERLY. Scale 1:125,000; contour interval 50 ft. Latitude of southern border 39° 0′; longitude of eastern border 92° 0′.

NEVADA. Scale 1:125,000; contour interval 50 ft. Latitude of southern border 37° 30′; longitude of eastern border 94° 0′.

SEDALIA. Scale 1:125,000; contour interval 50 ft. Latitude of southern border 38° 30′; longitude of eastern border 93° 0′.

SPRINGFIELD. Scale 1:125,000; contour interval 50 ft. Latitude of southern border 37° 0′; longitude of eastern border 93° 0′.

ST. LOUIS, WEST. Scale 1:62,500; contour interval 20 ft. Latitude of southern border 38° 30′; longitude of eastern border 90° 15′.

STOCKTON. Scale 1:125,000; contour interval 50 ft. Latitude of southern border 37° 30′; longitude of eastern border 93° 30′.

TUSCUMBIA. Scale 1:125,000; contour interval 50 ft. Latitude of southern border 38° 0′; longitude of eastern border 92° 0′.

VERSAILLES. Scale 1:125,000; contour interval 50 ft. Latitude of southern border 38° 0′; longitude of eastern border 92° 30′.

WARRENSBURG. Scale 1:125,000; contour interval 50 ft. Latitude of southern border 38° 30′; longitude of eastern border 93° 30′.

WARSAW. Scale 1:125,000; contour interval 50 ft. Latitude of southern border 38° 30′; longitude of eastern border 93° 0′.

MISSOURI AND ILLINOIS.

LOUISIANA. Scale 1:125,000; contour interval 50 ft. Latitude of southern border 39° 0′; longitude of eastern border 91° 0′.

ST. LOUIS, EAST. Scale 1:62,500; contour interval 20 ft. Latitude of southern border 38° 30′; longitude of eastern border 90° 0′.

MISSOURI AND KANSAS.

ATCHISON. Scale 1:125,000; contour interval 50 ft. Latitude of southern border 39° 30′; longitude of eastern border 95° 0′.

FORT SCOTT. Scale 1:125,000; contour interval 50 ft. Latitude of southern border 37° 30′; longitude of eastern border 94° 30′.

JOPLIN. Scale 1:125,000; contour interval 50 ft. Lati-

tude of southern border 37° 0′; longitude of eastern border 94° 30′.

KANSAS CITY. Scale 1:125,000; contour interval 50 ft. Latitude of southern border 39° 0′; longitude of eastern border 94° 30′.

MOUND CITY. Scale 1:125,000; contour interval 50 ft. Latitude of southern border 38° 0′; longitude of eastern border 94° 30′.

OLATHE. Scale 1:125,000; contour interval 50 ft. Latitude of southern border 38° 30′; longitude of eastern border 94° 30′.

MONTANA.

BIG SNOWY MOUNTAIN. Scale 1:250,000; contour interval 200 ft. Latitude of southern border 46° 0′; longitude of eastern border 109° 0′.

DILLON. Scale 1:250,000; contour interval 200 ft. Latitude of southern border 45° 0′; longitude of eastern border 112° 0′.

FORT BENTON. Scale 1:250,000; contour interval 200 ft. Latitude of southern border 47° 0′; longitude of eastern border 110° 0′.

FORT LOGAN. Scale 1:250,000; contour interval 200 ft. Latitude of southern border 46° 0′; longitude of eastern border 111° 0′.

GREAT FALLS. Scale 1:250,000; contour interval 200 ft. Latitude of southern border 47° 0′; longitude of eastern border 111° 0′.

HELENA. Scale 1:250,000; contour interval 200 ft. Latitude of southern border 46° 0′; longitude of eastern border 112° 0′.

LITTLE BELT MOUNTAIN. Scale 1:250,000; contour in-

XUM

terval 200 ft. Latitude of southern border 46° 0′; longitude of eastern border 110° 0′.

THREE FORKS. Scale 1:250,000; contour interval 200 ft. Latitude of southern border 45° 0′; longitude of eastern border 111° 0′.

NEVADA.

(See also Utah and Nevada; Arizona and Nevada, and Arizona, Nevada and California.)

DISASTER. Scale 1:250,000; contour interval 200 ft. Latitude of southern border 41° 0′; longitude of eastern border 118° 0′.

GRANITE RANGE. Scale 1:250,000; contour interval 200 ft. Latitude of southern border 40° 0′; longitude of eastern border 119° 0′.

LONG VALLEY. Scale 1:250,000; contour interval 200 ft. Latitude of southern border 41° 0′; longitude of eastern border 119° 0′.

PARADISE. Scale 1:250,000; contour interval 200 ft. Latitude of southern border 41° 0′; longitude of eastern border 117° 0′.

NEW HAMPSHIRE.

(See also Maine and New Hampshire; Massachusetts and New Hampshire; Massachusetts, New Hampshire and Vermont.)

NEW JERSEY.

(See also New York and New Jersey.)

ASBURY PARK. Scale 1:62,500; contour interval 10 ft. Latitude of southern border 40° 0′; longitude of eastern border 74° 0′.

ATLANTIC CITY. Scale 1:62,500; contour interval 10

ft. Latitude of southern border 39° 15′; longitude of eastern border 74° 15′.

BARNEGAT. Scale 1:62,500; contour interval 10 ft. Latitude of southern border 39° 45′; longitude of eastern border 74° 0′.

BORDENTOWN. Scale 1:62,500; contour interval 10 ft. Latitude of southern border 40° 0′; longitude of eastern border 74° 30′.

CAPE MAY. Scale 1:62,500; contour interval 10 ft. Latitude of southern border 38° 45′; longitude of eastern border 74° 45′.

CASSVILLE. Scale 1:62,500; contour interval 10 ft. Latitude of southern border 40° 0′; longitude of eastern border 74° 15′.

DENNISVILLE. Scale 1:62,500; contour interval 10 ft. Latitude of southern border 39° 0′; longitude of eastern border 74° 45′.

FRANKLIN. Scale 1:62,500; contour interval 20 ft. Latitude of southern border 41° 0′; longitude of eastern border 74° 30′.

HACKETTSTOWN. Scale 1:62,500; contour interval 20 ft. Latitude of southern border 40° 45′; longitude of eastern border 74° 45′.

LAKE HOPATCONG. Scale 1:62,500; contour interval 20 ft. Latitude of southern border 40° 45′; longitude of eastern border 74° 30′.

LITTLE EGG HARBOR. Scale 1:62,500; contour interval 10 ft. Latitude of southern border 39° 30′; longitude of eastern border 74° 15′.

LONG BEACH. Scale 1:62,500; contour interval 10 ft. Latitude of southern border 39° 30′; longitude of eastern border 74° 0′.

MORRISTOWN. Scale 1:62,500; contour interval 20 ft. Latitude of southern border 40° 45′; longitude of eastern border 74° 15′.

MOUNT HOLLY. Scale 1:62,500; contour interval 20 ft. Latitude of southern border 39° 45′; longitude of eastern border 74° 45′.

NEW BRUNSWICK. Scale 1:62,500; contour interval 10 ft. Latitude of southern border 40° 15′; longitude of eastern border 74° 15′.

PATERSON. Scale 1:62,500; contour interval 20 ft. Latitude of southern border 40° 45′; longitude of eastern border 74° 0′.

PEMBERTON. Scale 1:62,500; contour interval 10 ft. Latitude of southern border 39° 45′; longitude of eastern border 74° 30′.

PLAINFIELD. Scale 1:62,500; contour interval 20 ft. Latitude of southern border 40° 30′; longitude of eastern border 74° 15′.

PRINCETON. Scale 1:62,500; contour interval 20 ft. Latitude of southern border 40° 15′; longitude of eastern border 74° 30′.

SANDY HOOK. Scale 1:62,500; contour interval 10 ft. Latitude of southern border 40° 15′; longitude of eastern border 74° 0′.

SEA ISLE. Scale 1:62,500; contour interval 10 ft. Latitude of southern border 39° 0′; longitude of eastern border 74° 30′.

WHITINGS. Scale 1:62,500; contour interval 10 ft. Latitude of southern border 39° 45′; longitude of eastern border 74° 15′.

NEW MEXICO.

ALBUQUERQUE. Scale 1:125,000; contour interval 50 ft. Latitude of southern border 35° 0′; longitude of eastern border 106° 30′.

CHACO. Scale 1:250,000; contour interval 200 ft. Latitude of southern border 36° 0′; longitude of eastern border 108° 0′.

JEMES. Scale 1:125,000; contour interval 100 ft. Latitude of southern border 35° 30′; longitude of eastern border 106° 30′.

LARGO. Scale 1:250,000; contour interval 200 ft. Latitude of southern border 36° 0′; longitude of eastern border 107° 0′.

MOUNT TAYLOR. Scale 1:250,000; contour interval 200 ft. Latitude of southern border 35° 0′; longitude of eastern border 107° 0′.

SANTA CLARA. Scale 1:125,000; contour interval 100 ft. Latitude of southern border 35° 30′; longitude of eastern border 106° 0′.

WINGATE. Scale 1:250,000; contour interval 200 ft. Latitude of southern border 35° 0′; longitude of eastern border 108° 0′.

NEW MEXICO AND ARIZONA.

CANYON DE CHELLY. Scale 1:250,000; contour interval 200 ft. Latitude of southern border 36° 0′; longitude of eastern border 109° 0′.

FORT DEFIANCE. Scale 1:250,000; contour interval 200 ft. Latitude of southern border 35° 0′; longitude of eastern border 109° 0′.

ST. JOHN'S. Scale 1:250,000; contour interval 200 ft. Latitude of southern border 34° 0′; longitude of eastern border 109° 0′.

NEW YORK.

(See also Massachusetts, Vermont and New York; Massachusetts and New York; Massachusetts, Connecticut and New York; Rhode Island, Connecticut and New York.)

NORTH CAROLINA.

(See also Virginia and North Carolina; and Virginia, North Carolina and Tennessee.)

COWEE. Scale 1:125,000; contour interval 100 ft. Latitude of southern border 35° 0′; longitude of eastern border 83° 0′.

MORGANTOWN. Scale 1:125,000; contour interval 100 ft. Latitude of southern border 35° 30′; longitude of eastern border 81° 30′.

NORTH CAROLINA AND TENNESSEE.

ASHEVILLE. Scale 1:125,000; contour interval 100 ft. Latitude of southern border 35° 30′; longitude of eastern border 82° 30′.

CRANBERRY. Scale 1:125,000; contour interval 100 ft. Latitude of southern border 36° 0′; longitude of eastern border 81° 30′.

GREENEVILLE. Scale 1:125,000; contour interval 100 ft. Latitude of southern border 36° 0′; longitude of eastern border 82° 30′.

KNOXVILLE. Scale 1:125,000; contour interval 100 ft. Latitude of southern border 35° 30′; longitude of eastern border 83° 30′.

MOUNT GUYOT. Scale 1:125,000; contour interval 100 ft. Latitude of southern border 35° 30′; longitude of eastern border 83° 0′.

MOUNT MITCHELL. Scale 1:125,000; contour interval 100 ft. Latitude of southern border 35° 30′; longitude of eastern border 82° 0′.

MURPHY. Scale 1:125,000; contour interval 100 ft. Latitude of southern border 35° 0′; longitude of eastern border 84° 0′.

NANTAHALA. Scale 1:125,000; contour interval 100 ft. Latitude of southern border 35° 0′; longitude of eastern border 83° 30′.

ROAN MOUNTAIN. Scale 1:125,000; contour interval 100 ft. Latitude of southern border 36° 0′; longitude of eastern border 82° 0′.

NORTH CAROLINA AND SOUTH CAROLINA.

PISGAH. Scale 1:125,000; contour interval 100 ft. Latitude of southern border 35° 0′; longitude of eastern border 82° 30′.

SALUDA. Scale 1:125,000; contour interval 100 ft. Latitude of southern border 35° 0′; longitude of eastern border 82° 0′.

OREGON.

ASHLAND. Scale 1:250,000; contour interval 200 ft. Latitude of southern border 42° 0′; longitude of eastern border 122° 0′.

KLAMATH. Scale 1:250,000; contour interval 200 ft. Latitude of southern border 42° 0′; longitude of eastern border 121° 0′.

PENNSYLVANIA.

(See also New Jersey and Pennsylvania.)

DOYLESTOWN. Scale 1:62,500; contour interval 20 ft. Latitude of southern border 40° 15′; longitude of eastern border 75° 0′.

GERMANTOWN. Scale 1:62,500; contour interval 20 ft.

Latitude of southern border 40° 0′; longitude of eastern border 75° 0′.

HAZELTON. Scale 1:62,500; contour interval 20 ft. Latitude of southern border 40° 45′; longitude of eastern border 75° 45′.

LYKENS. Scale 1:62,500; contour interval 20 ft. Latitude of southern border 40° 30′; longitude of eastern border 76° 30′.

QUAKERTOWN. Scale 1:62,500; contour interval 20 ft. Latitude of southern border 40° 15′; longitude of eastern border 75° 15′.

RHODE ISLAND.

(See also Massachusetts and Rhode Island.)

BLOCK ISLAND. Scale 1:62,500; contour interval 20 ft. Latitude of southern border 41° 0′; longitude of eastern border 71° 30′.

BURRILLVILLE. Scale 1:62,500; contour interval 20 ft. Latitude of southern border 41° 45′; longitude of eastern border 71° 30′.

CHARLESTOWN. Scale 1:62,500; contour interval 20 ft. Latitude of southern border 41° 15′; longitude of eastern border 71° 30′.

KENT. Scale 1:62,500; contour interval 20 ft. Latitude of southern border 41° 30′; longitude of eastern border 71° 30′.

NARRAGANSETT BAY. Scale 1:62,500; contour interval 20 ft. Latitude of southern border 41° 30′; longitude of eastern border 71° 15′.

NEWPORT. Scale 1:62,500; contour interval 20 ft. Latitude of southern border 41° 15′; longitude of eastern border 71° 15′.

SAKONNET. Scale 1:62,500; contour interval 20 ft. Latitude of southern border 41° 15′; longitude of eastern border 71° 0′.

RHODE ISLAND AND CONNECTICUT.

MOOSUP. Scale 1:62,500; contour interval 20 ft. Latitude of southern border 41° 30′; longitude of eastern border 71° 45′.

PUTNAM. Scale 1:62,500; contour interval 20 ft. Latitude of southern border 41° 45′; longitude of eastern border 71° 45′.

RHODE ISLAND, CONNECTICUT AND NEW YORK.

STONINGTON. Scale 1:62,500; contour interval 20 ft. Latitude of southern border 41° 15′; longitude of eastern border 71° 45′.

SOUTH CAROLINA.

(See also North Carolina and South Carolina.)

PICKENS. Scale 1:125,000; contour interval 100 ft. Latitude of southern border 34° 30′; longitude of eastern border 82° 30′.

SOUTH CAROLINA AND GEORGIA.

WALHALLA. Scale 1:125,000; contour interval 100 ft. Latitude of southern border 34° 30′; longitude of eastern border 83° 0′.

TENNESSEE.

(See also Virginia, North Carolina and Tennessee; Virginia and Tennessee; Kentucky, Virginia and Tennessee; Kentucky and Tennessee; also North Carolina and Tennessee.)

CHATTANOOGA. Scale 1:125,000; contour interval 100

ft. Latitude of southern border 35° 0′; longitude of eastern border 85° 0′.

CLEVELAND. Scale 1:125,000; contour interval 100 ft. Latitude of southern border 35° 0′; longitude of eastern border 84° 30′.

KINGSTON. Scale 1:125,000; contour interval 100 ft. Latitude of southern border 35° 30′; longitude of eastern border 84° 30′.

LOUDON. Scale 1:125,000; contour interval 100 ft. Latitude of southern border 35° 30′; longitude of eastern border 84° 0′.

MAYNARDSVILLE. Scale 1:125,000; contour interval 100 ft. Latitude of southern border 36° 0′; longitude of eastern border 83° 30′.

MORRISTOWN. Scale 1:125,000; contour interval 100 ft. Latitude of southern border 36° 0′; longitude of eastern border 83° 0′.

TEXAS.

AUSTIN. Scale 1:125,000; contour interval 50 ft. Latitude of southern border 30° 0′; longitude of eastern border 97° 30′.

BASTROP. Scale 1:125,000; contour interval 50 ft. Latitude of southern border 30° 0′; longitude of eastern border 97° 0′.

BLANCO. Scale 1:125,000; contour interval 50 ft. Latitude of southern border 30° 0′; longitude of eastern border 98° 0′.

BRADY. Scale 1:125,000; contour interval 50 ft. Latitude of southern border 30° 0′; longitude of eastern border 99° 0′.

BROWNWOOD. Scale 1:125,000; contour interval 50 ft.

Latitude of southern border 31° 30′; longitude of eastern border 98° 30′.

BRECKENRIDGE. Scale 1:125,000; contour interval 50 ft. Latitude of southern border 32° 30′; longitude of eastern border 98° 30′.

BURNET. Scale 1:125,000; contour interval 50 ft. Latitude of southern border 30° 30′; longitude of eastern border 98° 0′.

COLEMAN. Scale 1:125,000; contour interval 50 ft. Latitude of southern border 31° 30′; longitude of eastern border 99° 0′.

EASTLAND. Scale 1:125,000; contour interval 50 ft. Latitude of southern border 32° 0′; longitude of eastern border 98° 30′.

FREDERICKSBURG. Scale 1:125,000; contour interval 50 ft. Latitude of southern border 30° 0′; longitude of eastern border 98° 30′.

GATESVILLE. Scale 1:125,000; contour interval 50 ft. Latitude of southern border 31° 0′; longitude of eastern border 97° 30′.

GEORGETOWN. Scale 1:125,000; contour interval 50 ft. Latitude of southern border 30° 30′; longitude of eastern border 97° 30′.

GRANBURY. Scale 1:125,000; contour interval 50 ft. Latitude of southern border 34° 0′; longitude of eastern border 97° 30′.

HAMILTON. Scale 1:125,000; contour interval 50 ft. Latitude of southern border 31° 30′; longitude of eastern border 98° 0′.

KERRVILLE. Scale 1:125,000; contour interval 50 ft. Latitude of southern border 30° 0′; longitude of eastern border 99° 0′.

LAMPASAS. Scale 1:125,000; contour interval 50 ft. Latitude of southern border 31° 0′; longitude of eastern border 98° 0′.

LLANO. Scale 1:125,000; contour interval 50 ft. Latitude of southern border 30° 30′; longitude of eastern border 98° 30′.

MASON. Scale 1:125,000; contour interval 50 ft. Latitude of southern border 30° 30′; longitude of eastern border 99° 0′.

MERIDIAN. Scale 1:125,000; contour interval 50 ft. Latitude of southern border 31° 30′; longitude of eastern border 97° 30′.

SAN SABA. Scale 1:125,000; contour interval 50 ft. Latitude of southern border 31° 0′; longitude of eastern border 98° 30′.

STEPHENVILLE. Scale 1:125,000; contour interval 50 ft. Latitude of southern border 32° 0′; longitude of eastern border 98° 0′.

TAYLOR. Scale 1:125,000; contour interval 50 ft. Latitude of southern border 30° 30′; longitude of eastern border 97° 0′.

UTAH.

(See also Colorado and Utah.)

BEAVER. Scale 1:250,000; contour interval 250 ft. Latitude of southern border 38° 0′; longitude of eastern border 112° 0′.

ESCALANTE. Scale 1:250,000; contour interval 250 ft. Latitude of southern border 37° 0′; longitude of eastern border 111° 0′.

FISH LAKE. Scale 1:250,000; contour interval 250 ft. Latitude of southern border 38° 0′; longitude of eastern border 111° 0′.

HENRY MOUNTAIN. Scale 1:250,000; contour interval 250 ft. Latitude of southern border 37° 0′; longitude of eastern border 110° 0′.

KANAB. Scale 1:250,000; contour interval 250 ft. Latitude of southern border 37° 0′; longitude of eastern border 112° 0′.

MANTI. Scale 1:250,000; contour interval 250 ft. Latitude of southern border 39° 0′; longitude of eastern border 111° 0′.

PRICE RIVER. Scale 1:250,000; contour interval 250 ft. Latitude of southern border 39° 0′; longitude of eastern border 110° 0′.

ST. GEORGE. Scale 1:250,000; contour interval 250 ft. Latitude of southern border 37° 0′; longitude of eastern border 113° 0′.

SALT LAKE. Scale 1:250,000; contour interval 250 ft. Latitude of southern border 40° 0′; longitude of eastern border 111° 0′.

SAN RAFAEL. Scale 1:250,000; contour interval 250 ft. Latitude of southern border 38° 0′; longitude of eastern border 110° 0′.

SEVIER DESERT. Scale 1:250,000; contour interval 250 ft. Latitude of southern border 39° 0′; longitude of eastern border 112° 0′.

TOOELE VALLEY. Scale 1:250,000; contour interval 250 ft. Latitude of southern border 40° 0′; longitude of eastern border 112° 0′.

UINTA. Scale 1:250,000; contour interval 250 ft. Latitude of southern border 40° 0′; longitude of eastern border 110° 0′.

UTAH AND NEVADA.

PIOCHE. Scale 1:250,000; contour interval 250 ft. Lati-

tude of southern border 37° 0′; longitude of eastern border 114° 0.

VERMONT.

(See New Hampshire and Vermont; Massachusetts, New Hampshire and Vermont; Massachusetts and Vermont; Massachusetts, Vermont and New York.)

VIRGINIA.

(See also Maryland, District of Columbia and Virginia; Maryland, Virginia and West Virginia; Maryland and Virginia; West Virginia, Virginia and Kentucky; Kentucky and Virginia; Kentucky, Virginia and Tennessee.)

BUCKINGHAM. Scale 1:125,000; contour interval 100 ft. Latitude of southern border 37° 30′; longitude of eastern border 78° 30′.

GOOCHLAND. Scale 1:125,000; contour interval 50 ft. Latitude of southern border 37° 30′; longitude of eastern border 77° 30′.

GORDONSVILLE. Scale 1:125,000; contour interval 100 ft. Latitude of southern border 38° 0′; longitude of eastern border 78° 0′.

HARRISONBURG. Scale 1:125,000; contour interval 100 ft. Latitude of southern border 38° 0′; longitude of eastern border 78° 0′.

LEXINGTON. Scale 1:125,000; contour interval 100 ft. Latitude of southern border 37° 30′; longitude of eastern border 79° 0′.

LURAY. Scale 1:125,000; contour interval 100 ft. Latitude of southern border 38° 30′; longitude of eastern border 78° 0′.

NATURAL BRIDGE. Scale 1:125,000; contour interval 100 ft. Latitude of southern border 37° 30′; longitude of eastern border 79° 30′.

SPOTTSYLVANIA. Scale 1:125,000; contour interval 50

ft. Latitude of southern border 38° 0′; longitude of eastern border 77° 30′.

WARRENTON. Scale 1:125,000; contour interval 50 ft. Latitude of southern border 38° 30′; longitude of eastern border 77° 30′.

VIRGINIA AND WEST VIRGINIA.

BEVERLY. Scale 1:125,000; contour interval 100 ft. Latitude of southern border 38° 30′; longitude of eastern border 79° 30′.

CHRISTIANSBURG. Scale 1:125,000; contour interval 100 ft. Latitude of southern border 37° 0′; longitude of eastern border 80° 0′.

FRANKLIN. Scale 1:125,000; contour interval 100 ft. Latitude of southern border 38° 30′; longitude of eastern border 79° 0′.

LEWISBURG. Scale 1:125,000; contour interval 100 ft. Latitude of southern border 37° 30′; longitude of eastern border 80° 0′.

MONTEREY. Scale 1:125,000; contour interval 100 ft. Latitude of southern border 38° 0′; longitude of eastern border 79° 30′.

POCAHONTAS. Scale 1:125,000; contour interval 100 ft. Latitude of southern border 37° 0′; longitude of eastern border 81° 0′.

STAUNTON. Scale 1:125,000; contour interval 100 ft. Latitude of southern border 38° 0′; longitude of eastern border 79° 0′.

TAZEWELL. Scale 1:125,000; contour interval 100 ft. Latitude of southern border 39° 0′; longitude of eastern border 81° 30′.

WINCHESTER. Scale 1:125,000; contour interval 100 ft.

Latitude of southern border 39° 0′; longitude of eastern border 78° 0′.

WOODSTOCK. Scale 1:125,000; contour interval 100 ft. Latitude of southern border 38° 30′; longitude of eastern border 78° 30′.

VIRGINIA AND NORTH CAROLINA.

HILLSVILLE. Scale 1:125,000; contour interval 100 ft. Latitude of southern border 36° 30′; longitude of eastern border 80° 30′.

WYTHEVILLE. Scale 1:125,000; contour interval 100 ft. Latitude of southern border 36° 30′; longitude of eastern border 81° 0′.

VIRGINIA, NORTH CAROLINA AND TENNESSEE.

ABINGDON. Scale 1:125,000; contour interval 100 ft. Latitude of southern border 36° 30′; longitude of eastern border 81° 30′.

VIRGINIA AND TENNESSEE.

BRISTOL. Scale 1:125,000; contour interval 100 ft. Latitude of southern border 36° 30′; longitude of eastern border 82° 0′.

WEST VIRGINIA.

(See also Maryland, Virginia and West Virginia; Maryland and West Virginia; Virginia and West Virginia.)

HINTON. Scale 1:125,000; contour interval 100 ft. Latitude of southern border 37° 30′; longitude of eastern border 80° 30′.

OCEANA. Scale 1:125,000; contour interval 100 ft. Latitude of southern border 37° 30′; longitude of eastern border 81° 30′.

RALEIGH. Scale 1:125,000; contour interval 100 ft. Latitude of southern border 37° 30′; longitude of eastern border 81° 0′.

ST. GEORGE. Scale 1:125,000; contour interval 100 ft. Latitude of southern border 39° 0′; longitude of eastern border 79° 30′.

WEST VIRGINIA, VIRGINIA AND KENTUCKY.

WARFIELD. Scale 1:125,000; contour interval 100 ft. Latitude of southern border 37° 30′; longitude of eastern border 82° 0′.

WISCONSIN.

EVANSVILLE. Scale 1:62,500; contour interval 20 ft. Latitude of southern border 42° 45′; longitude of eastern border 89° 15′.

KOSHKONONG. Scale 1:62,500; contour interval 20 ft. Latitude of southern border 42° 45′; longitude of eastern border 88° 45′.

WATERLOO. Scale 1:62,500; contour interval 20 ft. Latitude of southern border 43° 0′; longitude of eastern border 88° 45′.

YELLOWSTONE NATIONAL PARK.

CANYON. Scale 1:125,000; contour interval 100 ft. Latitude of southern border 44° 30′; longitude of eastern border 110° 0′.

GALLATIN. Scale 1:125,000; contour interval 100 ft. Latitude of southern border 44° 30′; longitude of eastern border 110° 30′.

LAKE. Scale 1:125,000; contour interval 100 ft. Latitude of southern border 44° 0′; longitude of eastern border 110° 0′.

XUM

SHOSHONE. Scale 1:125,000; contour interval 100 ft. Latitude of southern border 44° 0′; longitude of eastern border 110° 30′.

CENSUS BULLETINS

issued from the Census Bureau, U. S. Department of the Interior, from February 10, 1890, to November 28, 1891; being Nos. 1 to 150; and Extra Census Bulletins Nos. 1 to 14.

No. 1. Lists showing the supervisors' districts in the States and Territories by Counties. February 10, 1890. 4°, 12 pp.

No. 2. List of aquatic animals which are sought by fishermen. By C. W. Smiley. December 20, 1889. 4°, 8 pp.

No. 3. List of cities and towns in which the collection of general statistics of manufactures has been withdrawn from enumerators and the duty assigned to special agents. March 1, 1890. 4°, 4 pp.

No. 4. Names and addresses of supervisors of 11th census. April 23, 1890. 4°, 4 pp.

No. 5. Statement of the character of the inquiries as to recorded indebtedness of private individuals and corporations and the statistics of farms, homes and mortgages. May 15, 1890. 4°, 10 pp.

No. 6. Financial condition of Counties. By T. Campbell Copeland. August 4, 1890. 4°, 26 pp., 6 maps.

No. 7. Indebtedness of States in 1880 and 1890. By J. K. Upton. August 6, 1890. 4°, 4 pp.

No. 8. Mines and mining. Slate. By W. C. Day. August 8, 1890. 4°, 10 pp.

No. 9. Manufactures. Production of pig-iron. By W. M. Sweet. August 20, 1890. 4°, 8 pp.

No. 10. Mines and mining. Quicksilver. By J. B. Randal. August 22, 1890. 4°, 10 pp.

No. 11. Transportation. Rapid transit in cities. By H. C. Adams. August 23, 1890. 4°, 8 pp.

No. 12. Population by States and Territories.

No. 13. Manufactures. Production of steel.

No. 14. Indebtedness of municipalities. By T. Campbell Copeland.

No. 15. Census of Alaska.

No. 16. Population by States and Territories. December 12, 1890. 4°, 10 pp.

No. 17. Education. Preliminary statistics. By J. H. Blodgett. December 16, 1890. 4°, 10 pp.

No. 18. Statistics of churches. By H. K. Carroll. December 26, 1890. 4°, 26 pp.

No. 19. Vital statistics of the Jews in the United States. By J. S. Billings. December 30, 1890. 4°, 23 pp.

No. 20. Mines and mining. Anthracite coal. By John H. Jones. January 5, 1891. 4°, 13 pp.

No. 21. Population of New Hampshire by minor civil divisions. January 15, 1891. 4°, 4 pp.

No. 22. Manufactures. Distilled spirits consumed in the arts, manufactures and medicine. By H. Bower, and H. Pemberton, Jr. January 20, 1891. 4°, 9 pp.

XUM

No. 23. Areas of States and Counties. January 21, 1891. 4°, 14 pp.

No. 24. Population of Massachusetts by minor civil divisions. January 24, 1891. 4°, 6 pp.

No. 25. Statistics of Indians. By T. Donaldson. January 29, 1891. 4°, 14 pp.

No. 26. Mines and mining. Maryland coal. By J. H. Jones. January 30, 1891. 4°, 6 pp.

No. 27. Mines and mining. Alabama coal. By J. H. Jones. January 30, 1891. 4°, 6 pp.

No. 28. Transportation. Freight traffic on the Great Lakes. By H. C. Adams. January 31, 1891. 4°, 21 pp.

No. 29. Transportation. Changes in floating equipment on the Great Lakes since 1886. By H. C. Adams. February 4, 1891. 4°, 10 pp.

No. 30. Alaska. Statistics of population. February 11, 1891. 4°, 9 pp.

No. 31. Convicts in penitentiaries, 1890. By F. H. Wines. February 14, 1891. 4°, 20 pp.

No. 32. Distribution of population in accordance with mean annual rainfall. By H. Gannett. February 24, 1891. 4°, 4 pp.

No. 33. Distribution of population with reference to mean annual temperature. By H. Gannett. February 25, 1891. 4°, 4 pp.

No. 34. Centre of population in the United States in 1890. By Henry Gannett. February 27, 1891. 4°, 4 pp., 2 plates.

No. 35. Agriculture. Irrigation in Arizona. By F. H. Newell. February 27, 1891. 4°, 8 pp.

No. 36. Statistics of education. By J. H. Blodgett. February 28, 1891. 4°, 27 pp.

No. 37. Population of Counties. North Atlantic and South Atlantic divisions. March 7, 1891. 4°, 7 pp.

No. 38. Agriculture. By H. Gardner. March 10, 1891. 4°, 11 pp.

No. 39. Wealth and resources of Alaska. By Ivan Petroff. March 16, 1891. 4°, 15 pp.

No. 40. Population of Counties. North Central division. March 17, 1891. 4°, 9 pp.

No. 41. Agriculture. Farm trucking. By J. H. Hale. March 18, 1891. 4°, 12 pp.

No. 42. Population by Counties; South, Central and Western divisions. March 20, 1891. 4°, 9 pp.

No. 43. Coal product west of the Mississippi River. By J. H. Jones. March 21, 1891. 4°, 9 pp.

No. 44. Distribution of population in accordance with mean relative humidity of the atmosphere. By Henry Gannett. March 25, 1891. 4°, 3 pp.

No. 45. Mines and mining. Granite. By W.C. Day. March 26, 1891. 4°, 41 pp.

No. 46. Transportation. Railway statistics in the New England States. By Henry C. Adams. March 27, 1891. 4°, 18 pp.

No. 47. Distribution of population by drainage basins. By Henry Gannett. March 28, 1891. 4°, 5 pp.

No. 48. The white and colored population of the South. By H. Gannett. April 7, 1891. 4°, 27 pp.

No. 49. Mines and mining. Precious stones and diamond cutting. By G. F. Kunz. April 14, 1891. 4°, 3 pp.

No. 50. Population of Rhode Island by minor civil divisions. April 15, 1891. 4°, 3 pp.

No. 51. Population of Vermont by minor civil divisions. April 16, 1891. 4°, 4 pp.

No. 52. Urban population in 1890. Cities containing 8,000 inhabitants or more. By Henry Gannett. April 17, 1891. 4°, 9 pp.

No. 53. Statistics of education. By J. H. Blodgett. April 20, 1891. 4°, 34 pp.

No. 54. Public school finances. By J. K. Upton. April 23, 1891. 4°, 12 pp.

No. 55. Transportation. The relative economy of cable, electric and animal motive powers for street railways. By C. H. Cooley. April 24, 1891. 4°, 17 pp.

No. 56. Population of Maine by minor civil divisions. April 25, 1891. 4°, 7 pp.

No. 57. Population of Delaware by minor civil divisions. April 27, 1891. 4°, 3 pp.

No. 58. Population of Connecticut by minor civil divisions. April 28, 1891. 4°, 4 pp.

No. 59. Agriculture. Floriculture. By J. H. Hale. April 29, 1891. 4°, 11 pp.

No. 60. Agriculture. Irrigation in New Mexico. By F. H. Newell. April 30, 1891. 4°, 14 pp.

No. 61. Mines and mining. Mica. By L. J. Childs. May 8, 1891. 4°, 6 pp.

No. 62. Asylums for the insane in the U. S. By W. H. Olcott. May 9, 1891. 4°, 32 pp.

No. 63. Distribution of population in accordance with latitude and longitude. By Henry Gannett. May 11, 1891. 4°, 8 pp.

No. 64. Foreign, national, State and County indebtedness. By J. K. Upton. May 12, 1891. 4°, 52 pp.

No. 65. Distribution of population in accordance with topographical features. By Henry Gannett. May 13, 1891. 4°, 7 pp.

No. 66. Transportation. Floating equipments on the Great Lakes. By Henry C. Adams. May 14, 1891. 4°, 11 pp.

No. 67. Mines and mining. Bituminous coal in Pennsylvania. By J. H. Jones. May 15, 1891. 4°, 16 pp.

No. 68. Mines and mining. Manganese. By J. D. Weeks May 16, 1891. 4°, 5 pp.

No. 69. Population of New Jersey by minor civil divisions. May 18, 1891. 4°, 6 pp.

No. 70. Statistics of churches. By H. K. Carroll. May 22, 1891. 4°, 27 pp.

No. 71. Mines and mining. Bluestone. By W. C. Day. May 2?, 1891. 4°, 6 pp.

No. 72. Inmates of juvenile reformatories. By F. H. Wines. May 27, 1891. 4°, 9 pp.

No. 73. Mines and mining. Sandstone. By W. C. Day. June 1, 1891. 4°, 16 pp.

No. 74. Mines and mining. Coal product of Illinois, Ohio, Indiana and Michigan. By J. H. Jones. June 4, 1891. 4°, 18 pp.

No. 75. Mines and mining. Minor mineral industries. By E. W. Parker. June 8, 1891. 4°,50 pp.

XUM

No. 76. Mines and mining. Petroleum. By J. D. Weeks. June 9, 1891. 4°, 7 pp.

No. 77. Population of South Carolina by minor civil divisions. 4°, 7 pp.

No. 78. Mines and mining. Limestone. By W. C. Day. June 15, 1891. 4°, 16 pp.

No. 79. Mines and mining. Aluminium. By R. L. Packard. June 17, 1891. 4°, 11 pp.

No. 80. Mines and mining. Lead and zinc. By C. Kirchoff. June 18, 1891. 4°, 19 pp.

No. 81. Schools for the blind in the U. S. By W. H. Olcott. June 18, 1891. 4°, 7 pp.

No. 82. Receipts and expenditures of one hundred principal or representative cities of the U. S. By J. K. Upton. June 22, 1891. 4°, 13 pp.

No. 83. Population of Virginia by minor civil divisions. June 23, 1891. 4°, 9 pp.

No. 84. Statistics of education. By J. H. Blodgett. June 26, 1891. 4°, 37 pp.

No. 85. Agriculture. Irrigation in Utah. By F. H. Newell. June 29, 1891. 4°, 23 pp.

No. 86. Population of Idaho by minor civil divisions. July 1, 1891. 4°, 4 pp.

No. 87. Population of Nevada by minor civil divisions. July 2, 1891. 4°, 2 pp.

No. 88. Transportation on the Ohio River, and its tributaries above Cincinnati. By H. C. Adams. July 6, 1891. 4°, 8 pp.

No. 89. Distribution of population in accordance with altitude. By Henry Gannett. July 7, 1891. 4°, 5 pp.

No. 90. Paupers in almshouses in 1890. By F. H. Wines. July 8, 1891. 4°, 13 pp.

No. 91. Population of Wisconsin by minor civil divisions. July 9, 1891. 4°, 14 pp.

No. 92. Population of Wyoming by minor civil divisions. July 10, 1891. 4°, 3 pp.

No. 93. Population of Arizona by minor civil divisions. July 11, 1891. 4°, 4 pp.

No. 94. Mines and mining. Coal product of West Virginia, Kentucky, Tennessee, Virginia, Georgia, and North Carolina. By J. H. Jones. July 13, 1891. 4°, 16 pp.

No. 95. Prisoners in county jails. By F. H. Wines. July 14, 1891. 4°, 11 pp.

No. 96. Mines and mining. Copper. By C. Kirchoff. July 15, 1891. 4°, 9 pp.

No. 97. Population of Michigan by minor civil divisions. July 18, 1891. 4°, 18 pp.

No. 98. Public school finance. By J. K. Upton. July 20, 1891. 4°, 15 pp.

No. 99. Population of Iowa by minor civil divisions. July 21, 1891. 4°, 20 pp.

No. 100. Social statistics of cities. By J. S. Billings. July 22, 1891. 4°, 27 pp.

No. 101. Statistics of churches. By H. K. Carroll. July 23, 1891. 4°, 42 pp.

No. 102. Population of West Virginia by minor civil divisions. August 11, 1891. 4°, 7 pp.

No. 103. Horses, mules and asses on farms. By M. Whitehead. August 19, 1891. 4°, 8 pp.

No. 104. Assessed valuation of property. August 22, 1891. 4°, 3 pp.

XUM

No. 105. Population of Pennsylvania by minor civil divisions. August 24, 1891. 4°, 24 pp.

No. 106. Sentences of convicts in penitentiaries in 1890. By F. H. Wines. August 25, 1891. 4°, 20 pp.

No. 107. Agriculture. Irrigation of Wyoming. By F. H. Newell. August 27, 1891. 4°, 15 pp.

No. 108. Population of Indiana by minor civil divisions. August 31, 1891. 4°, 15 pp.

No. 109. Horticulture. Nurseries. By J. H. Hale. September 2, 1891. 4°, 46 pp.

No. 110. Population of Washington by minor civil divisions. September 3, 1891. 4°, 5 pp.

No. 111. Horticulture. Seed farms. By J. H. Hale. September 4, 1891. 4°, 23 pp.

No. 112. Population of Arkansas by minor civil divisions. September 19, 1891. 4°, 13 pp.

No. 113. Mines and mining. Iron ore. By J. Birkinbine. September 24, 1891. 4°, 32 pp.

No. 114. Population of Kansas by minor civil divisions. September 29, 1891. 4°, 20 pp.

No. 115. Transportation. Railway statistics: group ii. By H. C. Adams. October 5, 1891. 4°, 16 pp.

No. 116. Population of New York by minor civil divisions. October 8, 1891. 4°, 16 pp.

No. 117. Live stock on ranges. By M. Whitehead. October 10, 1891. 4°, 12 pp.

No. 118. Population of Utah by minor civil divisions. October 13, 1891. 4°, 6 pp.

No. 119. Population of Missouri by minor civil divisions. October 15, 1891. 4°, 17 pp.

No. 120. Transportation. Railway statistics : group iii. By H. C. Adams. October 16, 1891. 4°, 15 pp.

No. 121. Population of Ohio by minor civil divisions. October 17, 1891. 4°, 21 pp.

No. 122. Population of North Carolina by minor civil divisions. October 19, 1891. 4°, 13 pp.

No. 123. Fish and fisheries. Marine mammalia. By C. F. Pidgin, and B. Fesler. October 20, 1891. 4°, 18 pp.

No. 124. Population of Georgia by minor civil divisions. October 21, 1891. 4°, 16 pp.

No. 125. Population of Mississippi by minor civil divisions. October 22, 1891. 4°, 8 pp.

No. 126. Population of Nebraska by minor civil divisions. October 23, 1891. 4°, 15 pp.

No. 127. Population of Colorado by minor civil divisions. October 24, 1891. 4°, 9 pp.

No. 128. Population of Oklahoma by minor civil divisions. October 26, 1891. 4°, 3 pp.

No. 129. Population of New Mexico by minor civil divisions. October 27, 1891. 4°, 4 pp.

No. 130. Population of Montana by minor civil divisions. October 28, 1891. 4°, 3 pp.

No. 131. Statistics of churches. By H. K. Carroll. October 29, 1891. 4°, 62 pp.

No. 132. Population of Maryland and of the District of Columbia by minor civil divisions. October 30, 1891. 4°, 7 pp.

No. 133. Population of Louisiana by minor civil divisions. October 31, 1891. 4°, 7 pp.

No. 134. Population of California by minor civil divisions. November 2, 1891. 4°, 9 pp.

XUM

No. 135. Population of South Dakota by minor civil divisions. November 3, 1891. 4°, 10 pp.
No. 136. Population of Tennessee by minor civil divisions. November 4, 1891. 4°, 16 pp.
No. 137. Population of North Dakota by minor civil divisions. November 5, 1891. 4°, 9 pp.
No. 138. Population of Alabama by minor civil divisions. November 6, 1891. 4°, 12 pp.
No. 139. Population of Kentucky by minor civil divisions. November 7, 1891. 4°, 16 pp.
No. 140. Schools for the deaf and dumb in the United States. By W. H. Olcott. November 9, 1891. 4°, 11 pp.
No. 141.———————————————

No. 142. Transportation. Transportation by water on the Pacific Coast considered as an industry. By T. J. Vivian. November 11, 1891. 4°, 21 pp.
No. 143. Agriculture. Hops. By D. A. Ray. November 12, 1891. 4°, 12 pp.
No. 144. Population of Florida by minor civil divisions. November 17, 1891. 4°, 8 pp.
No. 145. Population of Illinois by minor civil divisions. November 19, 1891. 4°, 23 pp.
No. 146. Population of Oregon by minor civil divisions. November 23, 1891. 4°, 8 pp.
No. 147. Population of Minnesota by minor civil divisions. November 24, 1891. 4°, 17 pp.
No. 148. Population of Texas by minor civil divisions. November 25, 1891. 4°, 20 pp.
No. 149. Transportation. Railway statistics: group

iv. By Henry C. Adams. November 27, 1891. 4°, 15 pp.

No. 150. Population of Alaska. Official count. November 28, 1891. 4°, 7 pp.

EXTRA CENSUS BULLETINS.

No. 1. Increase and decrease of population, 1880-1890. April 8, 1891. 4°, 3 pp., 1 map.

No. 2. Distribution of population according to density. April 20, 1891. 4°, 4 pp., 1 map.

No. 3. Statistics of farms, homes and mortgages, Alabama and Iowa. By G. K. Holmes and J. S. Lord. April 22, 1891. 4°, 56 pp., 1 plate.

No. 4. Mines and mining. Mineral waters. By A. C. Peale. May 23, 1891. 4°, 17 pp., 1 map.

No. 5. Statistics of manufactures. Lumber mills and saw mills and timber products. By G. A. Priest. July 3, 1891. 4°, 64 pp.

Nos. 6-9. Insurance business in the United States. By C. A. Jenney. July 6, 7; Sep. 28, 29, 1891. 4°, 46, 57, 59, and 65 pp.

No. 10. Coal product of the United States. By J. H. Jones. September 30, 1891. 4°. 13 pp., 2 maps.

No. 11. Summary of statistics of education. By J. H. Blodgett. Oct. 7, 1891. 4°, 10 pp.

No. 12. (Not published.)

No. 13. (Not published.)

No. 14. Statistics of farms, homes and mortgages, Kansas. By G. K. Holmes and J. S. Lord. October 28, 1891. 4°, 29 pp.

GEOGRAPHICAL NOTES.

BY

GEO. C. HURLBUT, *Librarian.*

NINTH INTERNATIONAL CONGRESS OF AMERICANISTS: CHANGE OF DATE.—The Committee of Organization of this Congress announces that, in order to enable visitors from other Countries to use the time of their sojourn in Spain to the best advantage, it has been decided that the Sessions of the Congress of Orientalists shall be held at the Alcázar of Seville during the period of the 1-6 of October; and that the Congress of Americanists, to which the week named had originally been assigned, shall meet at the Convent of La Rábida on the 7-11 of October. The inauguration of the monument commemorating the discovery of America will take place at La Rábida, October 12, 1892.

The *Compañía Transatlántica* makes a reduction of 50 per cent. in the price of tickets to members of the Ninth International Congress of Americanists. These tickets will be good for eight months (from March or April to October or November). A similar reduction is offered by all the Spanish railway companies on tickets good for the month, September 25–October 25.

Any one may become a Member of the Congress on payment of 12 francs to the Secretario General D. Justo Zaragoza, 11 Calle de San Mateo, Madrid; or at the Consulate of Spain, in any city.

THE EXHIBITION AT GENOA.—The Italo-American Exhibition for the Centenary of the Discovery of the New World will be opened in Genoa on the 1st of June and closed on the 30th of November, 1892.

Besides the display of industrial products of all countries, there will be public festivals and entertainments, the inauguration of the monuments to Garibaldi and to the Duke of Galliera, Congresses of Geography, of History and of Maritime Law, a grand Historical Festival, a Tournament of the Columbian period, an Exhibition of Ancient Works of Art, an Exhibition illustrating the history of the Catholic Missions in America, Illuminations, Gymnastic Contests and popular celebrations. Mr. J. P. Riva, the Italian Consul-General, will furnish information concerning details.

FAUSTO RUGHESI.—Prof. M. Fiorini, in the *Bollettino della Società Geografica Italiana* for November, 1891, describes a map of the world by Fausto Rughesi, a cartographer of the XVI century, of whom no previous writer on geography has made mention.

This map and four others by Rughesi belong to the Barberini Library in Rome. They were drawn in that city and printed there in 1597; and they are dedicated to Vincenzo Gonzaga, Duke of Mantua and Monferrato.

The map of the world, the only one which Prof. Fiorini had time to examine during his visit to Rome, measures 525x700 millimetres (20 7-8 x 27 5-8 in.). It is in two parts, enclosed by circles, with a diameter of 335 millimetres (13 3-16 in.). The two hemispheres (the one embracing the Old World, the other the New)

have their common base in the great circle that passes through the westernmost of the Canary Islands (from which the longitude is reckoned), and the point marked by the meridian of 90° west longitude and 78° north latitude.

The north pole is in the circle enclosing the Old World, the south pole in the other.

The projection employed is the horizontal orthographic, which is a true perspective. The meridians and the parallels are shown by curved lines forming ellipses, as the system requires.

The shading of the two hemispheres is masterly, and brings out the convexity and rotundity of the sphere.

Rughesi appears to have taken from the celestial planispheres, constructed after the rules of orthographical projection, the idea of applying that method to terrestrial maps. Intimately acquainted, as he was, with the theory and practice of perspective, he drew his map, not with reference to the equator, or the meridian, according to the practice and the precept of his time, but from the horizon, or a given great circle, the common base of the two hemispheres

The optical illusion, which is slight in polar and meridian orthographical projections, is very great in the horizontal, and strong relief is given to the rotundity of the sphere by the curves and intersections of the elliptical meridians and parallels; and in Rughesi's map the shading heightens this relief.

The subject of the orthographic projection has been treated by D'Aguillon (1613), Fournier (1679), and Varenius,* but no one of these mentions the horizontal

*Prof. Fiorini refers to the Naples edition of 1725. The first Amsterdam edition bears the date of 1650.

orthographic projection ; and Nordenskiöld, unacquainted with the work of Rughesi, declares in the *Fac-simile Atlas* (p. 93) that no map on this projection was published before the XVII century.

In view of these facts, Prof. Fiorini concludes that Rughesi was the first cartographer to employ the perspective method, illustrated by the Barberini map.

The cartographer's name is mentioned by a few writers, and Prof. Fiorini prints, in an appendix to his paper, eleven letters from the Gonzaga Archives at Mantua; but the sum of the information he has brought together is that Rughesi was a native of Montepulciano, that he was of good family, and that he was well known as an accomplished historian and geographer.

Maps by Mercator.—The Geographical Society of Berlin has brought out, through Mr. W. H. Kühl, publisher, a portfolio containing fac-simile reprints of three maps by Gerhard Mercator, lately recovered in the process of classifying the collections of the Breslau town library. These maps are : *Europe* (1554), in 15 sheets ; *The British Isles* (1564), in 8 sheets ; *Chart of the World* (1569), in 18 sheets.

The *Chart of the World* was already known by Jomard's reproduction of the copy, belonging to the National Library of Paris, but the *Europe* and the *British Isles* were supposed to have perished. Their recovery is an event, and the Berlin Society has deserved well of the scientific world by making these cartographical monuments accessible to all in the superb sheets issued from the Imperial Printing Office.

THE WATERS OF SOUTHERN NEW ENGLAND.—The U. S. Fish Commission has just brought out the Report, by Prof. William Libbey, Jr., upon the *Physical Investigation of the Waters of the Southern Coast of New England, made during the Summer of 1889 by the U. S. Fish Commission Schooner Grampus.* Prof. Libbey explains, as follows, the purpose and plan of the investigation:

"The object of the expedition was to study the temperature relations between the cold wall of the Labrador current and the warm waters of the Gulf Stream, with the idea of establishing some connection between the changes in temperature in the waters and the migrations of the fish which inhabit them. . . .

"It is believed that in the seasonal variations of the hydro-isothermal lines will be found the key to explain the migrations and the geographical distribution of our important food species as well as of the food upon which they subsist, as both depend upon the temperature variations which determine the changes that occur in their location. It may also happen that while the changes in position of these areas of equal temperature will differ in succeeding seasons, they will, however, stand in some essential relation with the general meteorological conditions upon the land which are under constant observation and discussion. The data eventually obtained will undoubtedly lead to important generalizations bearing upon the questions of physical geography and biological physics, or the relation of marine species to their physical environment.

"Our plan of operations was to start at a point south of Nantucket Island, and then running due south, to

make a series of soundings, accompanied by a set of observations upon the temperature and specific gravity of the water at various depths. The observations were made by means of instruments attached to a steel-wire cable which was controlled upon the deck of the vessel. These serial-temperature and specific-gravity observations were made as nearly as possible 10 minutes of latitude apart. To the westward of this first line, a series of such lines were run out from the shore well into the Gulf Stream, at intervals of 10 minutes of longitude. There were nine of these lines, four of which were afterwards duplicated, and upon each of these lines at right angles to the coast there were usually twelve or thirteen stations. . . .

"The instruments were placed upon the 5, 10, 15, 20, 25, 30, 40, 50, 75, 100, 150, 200, 250, 300, 400 and 500 fathom points, and thus, with the surface observation, seventeen observations in all were made at all the deep-sea stations; of course in shallower water fewer observations were made, but the intervals between the instruments remained the same.

"It will be seen that the instruments were placed closer together near the surface where the changes of temperature were most rapid. By this means we sought to obtain a cross-section, so to speak, of the water on each of the lines, which were from 120 to 130 miles long."

The Report gives the meteorological records, the deep-sea temperatures and the observations on the specific gravity of the water. More than 1,600 observations of temperature were made, and 360 meteorological observations were taken daily. A map shows

XUM

the 136 stations occupied, 46 of these in water over 100 fathoms deep.

The accompanying temperature charts show in every instance a remarkable downward curvature of the 50° bathy-isothermal line, off the continental platform. Prof. Libbey says:

"The peculiar shape of this curve would seem to point to a mechanical intrusion of cold water from the surface of the continental platform, which may be reinforced by the specific gravity of the water, as would appear from a study of some of the observations made, notably the specific gravities at the 100-fathom line in charts 2 and 3.

"The existence of this body of warm water off the continental edge may offer an explanation of the richness of this particular spot in all forms of marine life, as shown by the successful dredging of the *Albatross* upon it."

While the importance of further investigation in the same direction is clearly indicated by the results attained, no extended generalization is attempted.

ALTITUDES IN THE UNITED STATES.—The second edition of Mr. Henry Gannett's *Dictionary of Altitudes in the United States* forms Bulletin No. 76, (1891) of the U. S. Geological Survey. In the first edition (Bulletin No. 5, 1884), the elevations are tabulated by States and Territories, alphabetically arranged, while in the second there is a single alphabetic arrangement throughout the work. Each method has its special advantages, and the one may be said to complete the other, though the later work contains many additional determinations of altitudes by railroads.

The errors which had escaped notice in Bulletin No. 5 seem to have been corrected in No. 76,* and the author may look upon the result of his labors with some satisfaction.

The observations are numerous enough to give an idea of the relief in each State and Territory.

In Maine, the highest point is Mt. Katahdin, 5,200 ft. Next comes Mt. Abraham, 3,388 ft., and then Barker's Mountain, 2,551 ft. The other measurements (about 150 in number) range from 2,021 down to 4 ft., the height of the R. R. wharf at Portland. Mt. Desert is at an elevation of 1,527 ft.

In New Hampshire, Mt. Washington rises to 6,288 ft.; and of about 250 other stations 45 exceed 4,000 ft. in height, and twice as many range between 4,000 and 1,000 ft.

There are 5 points in Vermont over 4,000 ft. in height, 10 between 3,000 and 4,000 ft., 6 between 2,000 and 3,000 ft., and 18 between 1,000 and 2,000 ft. The lowest measurement is Lake Champlain, 101 ft. above the sea, and the highest Mt. Mansfield, 4,430 ft.

Of nearly 300 stations in Massachusetts the highest is Greylock, 3,535 ft. Then follow Bald Peak, 2,624 ft., Mt. Hoosac, 2,510 ft., East Mountain 2,276 ft., and Wachusett, 2,018 ft.

The greatest elevation in Connecticut is at Norfolk,

---

* One exception, at least, should be noted. On p. 23 two names are entered within five lines, as follows:

Agua Flegra, N. Mex. Wheeler, 8,194.

Agua Negra, N. Mex. Wheeler, 8,194.

Agua Negra is in Wheeler's list, but Agua Flegra, the invention of the copyist or the printer, is not to be found.

XUM

1,220 ft.; and Pascoag, 396 ft., is the highest point in Rhode Island.

The altitudes in New York, some 1,200 in number, are about equally divided between those of less than 1,000 ft. and those ranging from 1,000 to a little over 5,000 ft. Mt. Marcy, the highest of the Adirondacks, measures 5,403 ft. Three other peaks exceed 5,000 ft., but not many others attain 4,000 ft. Niagara Falls Station is 574 ft. above the sea.

Pennsylvania, in which not far from 2,000 measurements are registered, shows not one higher than 2,495 ft.; and in New Jersey the greatest elevation is at High Knob, 1,799 ft.

In Delaware the extremes are, 282 ft. at Dupont's, and 7 ft. at Wilmington.

The highest stations of the 200 in Maryland are Altamont, 2,620 ft., and Oakland, 2,371 ft., both on the Baltimore and Ohio Rail Road.

White Top, 5,530 ft., Elliot Knob, 4,473 ft., and the Peaks of Otter, 3,993 ft., are the greatest altitudes, out of about 450 recorded for Virginia. The elevation of the Natural Bridge is 736 ft.

In the District of Columbia the dome of the Capitol is 379 ft., and the Soldier's Home 410 ft., above sea-evel.

West Virginia has 3 stations of about 3,100 ft., 6 of a little over 2,000 ft., and 38 between 1,000 and 2,000 ft., out of 120 measured.

The highest mountains east of the Mississippi are in Western North Carolina and Eastern Tennessee. There are in all 46 peaks that exceed 6,000 ft. in height, and 21 of these are loftier than Mt. Washington. The

highest point is Mitchell High Peak (6,688 ft.) in North Carolina. Asheville, surrounded by high mountains, is at an elevation of 1,994 ft.

The mountains of South Carolina and Georgia are lower: 5 in South Carolina are between 3,000 and 4,000 ft.; 2 in Georgia slightly exceed 5,000 ft., and 8 are between 4,000 and 5,000 ft. In all these States, from Virginia to Georgia, the measurements outside of the mountain region show a nearly uniform elevation of 700 or 800 ft. In Florida the level sinks, the highest station being Highland, 210 ft., and the lowest Fernandina, 7 ft. Alabama has an average elevation of 420 ft., Mississippi one of 256 ft., and Louisiana one of 29 ft., the lowest in the country. New Orleans is 4 ft., and Le Boeuf 2 ft. above the sea-level.

In the Mississippi Valley north of the Gulf States, the highest point is Harney Peak, in South Dakota, 7,368 ft. The average elevation is highest in North and South Dakota, 1,930 ft., and lowest in Arkansas, 440 ft.

In Texas the highest point is Fort Davis, 4,918 ft., while Galveston stands only 3 ft. above the sea-level; and the average elevation of the State, with its 275,000 square miles, is about 850 ft.

The altitudes in the Rocky Mountain region and westward to the Pacific are much greater than those in the Eastern and Central States. Montana has 12 peaks that rise to more than 10,000 ft., and the average of the other measurements is 4,407 ft. In Wyoming there are 57 mountains more than 10,000 ft. high, the highest being the Grand Teton, 13,691 ft. Exclusive of the higher mountains, the average elevation is 7,280 ft.

XUM

The highest point in the Yellowstone National Park is Turret Mountain, 11,142 ft.

Out of 850 stations measured in Colorado 340 are of mountains more than 10,000 ft. high, and 58 of these exceed 14,000 ft. The loftiest point is Gray's Peak, 14,341 ft. The altitude of Denver is 5,294 ft., and the average elevation of the State is 7,067 ft.

Cerro Blanco, 14,269 ft., is the greatest altitude registered in New Mexico, and there are 34 other stations above 10,000 ft. Santa Fé is 6,862 ft. above the sea. The average of the measurements, omitting the 35 peaks, is 6,175 ft.

The greatest elevations in Idaho are: Meade Peak, 10,541 ft.; Cache Peak, 10,451 ft.; and Sawtelle Peak, 10,013 ft. The average elevation is 5,700 ft.

There are in Utah 71 peaks, that exceed 10,000 feet in height, the loftiest being Emmons Peak, 13,624 ft., in the Uinta Mountains. The average elevation of the Territory is 6,020 ft.; that of the Salt Lake Signal Station is 4,346 ft.

In Arizona, which counts 13 peaks above 10,000 ft., the highest is San Francisco Mountain, 12,794 ft. Tucson is at the moderate elevation of 2,404 ft. The lowest point is Yuma, 141 ft.; and the average of the measurements below 10,000 ft. is 5,350.

The average for Nevada is 5,400 ft., exclusive of 30 mountains above 10,000 ft.; Wheeler Peak, the highest, rising to 13,036. The elevation of Virginia City is 6,339 ft.

In the States on the Pacific the average level sinks. In Washington it is 1,800 ft., New Tacoma, 31 ft., being the lowest point. Rainier, the highest mountain, rises to 14,444 ft.

The timber line on the Cascade Range in Oregon is 7,000 ft., and of 10 mountains which rise above it the highest is Mount Pitt, 9,760 ft. The lowest level is 5 ft., at North Sands, and the average for the State, omitting the higher mountains, is 1,600 ft.

California numbers 41 mountains more than 10,000 ft. high, the three at the head of the list being Mount Whitney, 14,898, Fisherman Peak, 14,448, and Shasta, 14,350 ft. The Yosemite Valley is elevated 4,060 ft. and the cliffs and domes about it range from 7,000 to 9,000 ft. above the sea. Death Valley, in the southern part of the State, sinks from—6 ft. at Bennett's Wells to—225 ft. at King Springs.* A greater depression is at Salton, 263 ft. below the sea. Omitting the extremes of height and depth, the average of the elevations in the State is 3,030 ft.

The highest summits in the United States are in Alaska. Mr. Dall's measurements are: Mount St. Elias, 19,500; Mount Cook, 16,000; Mount Crillon, 15,900; and Mount Fairweather, 15,500 ft. He is the only authority for Mts. Cook and Crillon; but for Mt. Fairweather Mr. Gannett gives six other measurements: Malaspina, 14,589; Tebenkoff, 14,000; Vasilieff, 13,946; Russian Hydrographic Chart, 14,708; English Admiralty Chart, 14,708; and Tebenkoff, chart III., 13,864 ft. For Mt. St. Elias Mr. Gannett has six authorities: Malaspina, 17,854; Tebenkoff, 16,938; La Perouse, 12,661; English Hydrographic Chart, 14,970; Russian Hydrographic Chart, 17,854; and Dall, 19,500 ft. These do not quite

*Capt. Wheeler says (*Tables of Geog. Positions, etc., Washington*, 1885, *p.* 145): "Death Valley, greatest depression measured. . . —110 ft."

agree with the figures given by Dall, in the Report of the Superintendent of the U. S. Coast and Geodetic Survey for 1875. The latest measurement is that made in the summer of 1891 by Mr. Israel C. Russell, of the expedition sent out by the National Geographic Society and the U. S. Geological Survey. Mr. Russell's report on the height and position of Mount St. Elias was laid before the National Geographic Society, December 11, 1891, and is printed in the Society's *Magazine*, Vol. III., pp. 205–261.

The mean elevation of St. Elias above sea-level is, according to this report, 18,099 ft.; and its position is settled, approximately, in longitude 140° 55′ 30″ West from Greenwich. To use Mr. Russell's words: "The mountain is thus one and one-half miles south of the boundary and within the territory of the United States. The position is so near the junction of the boundary separating southeastern Alaska from the Northwest Territory with the 141st meridian that it is practically a corner monument of our national domain."

Mr. A. Lindenkohl writes, in *Petermanns Mitteilungen, 38 Band, I.*, that Mr. Russell's measurement leaves the question still undecided whether Mt. St. Elias or the Peak of Orizaba (18,205 ft., according to Prof. Heilprin) is the highest mountain in North America; and the editor of the *Mitteilungen* adds, in a note, that he has seen no occasion to change his opinion, expressed in 1891, as to the uncertain character of Prof. Heilprin's results.

THE GEOGRAPHICAL SOCIETY OF CALIFORNIA.—This Society was incorporated on the 11th of December,

1891. Its officers are: President, David Starr Jordan, M.D., LL.D., PH.D. (President of the Leland Stanford, Junior, University); Vice-Presidents, Fred. W. D'Evelyn, M.B.C.M., Edin., Colonel John O'Byrne; Directors, George W. Davis, M.D., Wm. Ham Hall, C.E., George A. Moore, Henry F. Emeric, Peter MacEwen, Edgar D. Peixotto, Hon. W. H. Pratt, U. S. Surveyor-General; Treasurer, R. H. McDonald, Jr., Vice-President, of the Pacific Bank; Secretary, J. Studdy Leigh. F.R.G.S. The establishment of this second society in San Francisco must be taken as evidence of the growing interest in geography throughout the country, and it is gratifying to welcome a reinforcement to the workers in so wide a field.

A RELIEF EXPEDITION.—The following circular letter has been received:

"PEARY RELIEF EXPEDITION.

"The Academy of Natural Sciences of Philadelphia, at a meeting held on the 26th of January last, upon the recommendation of the Council, unanimously voted in favor of the organization of an expedition for the relief of Engineer R. E. Peary and his associates, now in winter-quarters on the north-west coast of Greenland. The leadership of such expedition has been delegated to Professor Angelo Heilprin, the second in command of the expedition of 1891. The difficulties and hazards of the expedition which Lieut. Peary has undertaken—which, if successfully accomplished, will constitute one of the most noteworthy geographical events of the century—are such as to necessitate this relief. It is estimated that the cost of the expedition will be approxi-

mately $10,000, which it is the hope of the Academy to raise through voluntary contributions.

"A subscription in *any* amount will be thankfully received by the undersigned Committee: Gavin W. Hart, Secretary and Treasurer; Uselma C. Smith, Dr. Benjamin Sharp, Dr. Samuel G. Dixon, Angelo Heilprin, *Chairman.* Academy of Natural Sciences, Philadelphia, February, 1892."

Mr. Peary says, in the "Outline of a Project for reaching the northern terminus of Greenland, *via* the Inland Ice," laid before the Council of the American Geographical Society in the spring of 1891*:

"Party of five or six to be landed by a whaler in June, or early in July, at, or near the mouth of Whale Sound." . . .

He then sketches the occupations of the party for the summer (of 1891) and the winter (of 1891–92), and proceeds:

"Early in the spring (of 1892) four or five of the party to start overland across the 'Inland Ice' to Humboldt Glacier, with all the sledges and dogs, leaving one man in charge of the house.

"If the travelling and the weather be favorable, the sledge party will go on from Humboldt Glacier to the head of Petermann Fjord (90 naut. miles). Here a depot will be established, and two or three of the party with their dogs and sledges and a full supply of provisions will proceed; the remaining man or men, with the empty sledges and extra dogs, returning to Whale Sound, where they, with the one left in charge of the house, will utilize their time in hunting for the winter's

* The dates in parentheses are not in the original.

supply of meat, collecting specimens, making meteorological observations and surveying.

The sledge party will proceed from the head of Petermann Fjord to the head of Sherard Osborne Fjord (120 naut. miles), establish a depot there, then to the head of Meigs Fjord (110 naut. miles), establish a depot there, thence to the northern terminus of Greenland (100 to 200 (?) miles). This point reached and determined, the party would return, taking up the various depots.

The following winter (1892-93) to be spent in putting the results of the work in shape, and in the early summer (of 1893) the party to come down to C. York, go aboard one of the whalers, and return home."

Mr. Peary and his party left New York June 6, 1891, in the steamer *Kite*, and landed, late in July, on the south side of McCormick Bay, the entrance to Whale Sound being obstructed by ice.

The *Kite* left the party on July 30th, and arrived at St. John's, Newfoundland, August 23, 1891. In the letters which she brought to the American Geographical Society nothing is said of a change of plan; and it has been impossible to communicate with Mr. Peary since those letters were received.

The original plan, therefore, of a two years' sojourn in Greenland is the one now in process of execution; and in the absence of the special information, which the Academy of Natural Sciences must be supposed to possess, this Society has only to declare its perfect confidence in Mr. Peary's ability to accomplish his task and to effect his return in the summer of 1893.

DR. NANSEN'S PROPOSED EXPEDITION.—The expedition under Nordenskiöld, which was to have been sent to the Antarctic Continent at the joint expense of the Australian Colonies and Baron Oscar Dickson, has fallen through, the Colonies having failed to subscribe the necessary funds. This failure is due, as Dr. Nansen kindly suggests, to bad management on the part of those who took the enterprise in hand. He is now in England, engaged in raising money for his expedition to the North Pole, his original plan of an exclusively Norwegian enterprise having failed, for reasons as yet unexplained. He now proposes to leave Europe in January, 1893, for the mouth of the Lena river, probably by way of Bering Strait. He is satisfied that a current sets from the Siberian coast directly across the Pole to the north coast of Greenland. His specially constructed vessel of 250 tons is nearly completed, with accommodations for 12 men. Provisions for six years will be taken, and these will be supplemented by fresh meat, as it can be obtained. The engine will be used for the production of the electric light, and, when the steamer is laid up, the men will take the place of the engine. Tents and boats will, of course, be taken, and a balloon, the gas for which will be put on board in storage cylinders. The expedition will remain in the Arctic for three or four years.

A CORRECTION.—A story, describing the conduct of the American Babylonian Exploration party, was published in *Biblia* for August, 1891. No subsequent number of the magazine contradicted the story, and it was treated in the BULLETIN for December as a statement of facts.

What was there said must now be recalled, in view of the following letter and the admission made in *Biblia* for March, 1892 (p. 342), that the charges were without foundation:

NEW YORK, MARCH 9TH, 1892.

To the Editor of the Bulletin of the American Geographical Society:

SIR: In the December number of the BULLETIN, pp. 639 ff., copying from *Biblia*, you have published some startling and defamatory information regarding the American Expedition to Babylonia, of which I was director, as also certain sarcastic observations on our moral conduct. The reflections on our moral conduct would be unobjectionable, if the facts were as reported; but the whole story is a canard. It first appeared in a couple of the New York morning papers, not remarkable for common honesty, much less for scientific information. The raw material for the fabrication was a letter from an oriental in Beirout, who simply retailed the ridiculous gossip of that place. The manufacturer of the completed article was a common impecunious reporter who decorated the story, after the fashion of reporters, with such ornaments as his ignorance of geography, archæology and truth suggested, in the hope of making an acceptable and profitable article.

By what accident this canard crept into the columns of *Biblia* it is unnecessary to explain, for that journal has already corrected its error.

Briefly stated the facts are these: We did not land at Beirout. No tablets were seized at Smyrna, and we did not recover some of our money by selling arms

to the natives. Our relations to the Turkish government were throughout friendly, and the Turkish officials treated us with courtesy and even generosity.

Very respectfully yours,

JOHN P. PETERS.

SLAVERY IN EUROPE.—Dr. R. A. Philippi prints in the *Verhandlungen des Deutschen Wissenschaftlichen Vereins*, Santiago (Chile), the results of his reading for a number of years on the subject of Slavery and the Slave Trade in the European States, during the Middle Ages and down to the XVIII century.

He has not been able to find any work on this subject in German literature.

The principal results arrived at are:

1. That slavery and the slave-trade ceased in the different countries at very different dates.

2. That the cessation was in no case due to a prohibition on the part of the Government.

3. That the Church had a substantial part in the abolition, because it zealously opposed the holding of Christians in slavery.

4. That the credit due to the Church for its opposition is not diminished by the fact that the heathen and the Mohammedans were reduced to slavery, and that public opinion sanctioned the practice.

5. That slavery endured in southern Europe to the end of the XVII century, and perhaps even into the first years of the XVIII.

Under Charlemagne, slaves, mostly Bretons, were sold in the markets, but the following extract (which Dr. Philippi cannot refer to its source) proves that

a decree must have been promulgated against the trade: "Charlemagne had already shown himself hostile to the Venetians in the year 785, when at his command their merchants were expelled by Pope Adrian from the Exarchate (of Ravenna) and the Pentapolis * because they carried on the forbidden commerce in slaves." On the other hand, Schroeder says (*Gesch. Karls des Grossen*, S. 198): "In Italy the trade in human beings was carried on also beyond sea, and the unfortunates were mutilated, in order to make them more attractive wares in the Oriental market."

Rome was the centre of the Italian slave trade and here the Venetians bought the Christians, whom they sold to the Mohammedans, while the Spaniards brought to the same place, and disposed of, the Mohammedan slaves that they had taken in war or in piratical expeditions.

The most important slave mart in France was Lyons, which was supplied with multitudes of captives of Slavic origin, as well as with the Moors brought from Spain.

Bristol and London were noted for this commerce under the later Saxon Kings; but real slavery and the slave trade gradually disappeared from England in the early centuries of the Norman period, except in Bristol, which, with Verdun, Lyons and Venice, continued the traffic down to the XV century.

Dr. Philippi is not able to give the names of the German slave-trading places, but he is inclined to believe that Magdeburg was the head of them. At Whitsuntide in 1285, at Magdeburg, the winner in a shooting

* The five cities on the Adriatic—Rimini, Pesaro, Fano, Sinigaglia and Ancona.

contest was rewarded with the prize of a girl; and another instance occurred in 1387, when a townsman of Aschersleben won the girl.

Actual slavery began to cease in Germany in the XVI century,* and the great slave markets on the North Sea and the Baltic were closed.

This cessation was due, in Dr. Philippi's opinion, to the influence of the Church, which forbade Christians to sell their fellow Christians, just as the Mohammedan religion forbids its followers to enslave Mussulmans, at least those of the same sect. When the Slavs, the eastern neighbors of the Germans, were converted to Christianity, the authority of the Church protected them, while in southern Europe, down to the end of the XVII century, no one thought of questioning the right to hold Mohammedans in bondage.

Under Igor, the son of Rurik (A.D. 912-945), Russian traders carried on a brisk slave trade with Constantinople. The dealers were Normans, but there is doubt as to the nationality of the slaves. They were probably Irish, for the Normans sold men and women of that race in the German ports, and especially in Hamburg and Lübeck.

Dr. Philippi finds but two extracts for the XI, XII, XIII and XIV centuries. One states that after the defeat of the Moors at Narbonne, in 1018, the captives were sold by auction at Carcassonne. The other is a passage in the Sixth Tale of the Decameron (the action being in the year 1282), where it is said that Genoese corsairs divided among themselves the people they had taken at sea.

*The text reads. "Schon seit dem 19 Jahrhundert," u. s. w., an evident misprint for 16.

Negro slaves were first imported into Spain and Portugal after the expulsion of the Arabs, and when the Portuguese had fairly begun their career of discovery.

The historian Damião de Goes computes the yearly importation into Lisbon at from 10,000 to 12,000 negroes (not including Moors). It was in 1434 that a man named Gonzales first offered Africans for sale in Portugal.

The famous Children's Pilgrimage to St. Michel in Normandy occurred in 1462, and the Bavarian Chronicle records that the children suddenly appeared in Bavaria, through which they had to pass, that many of them died of hunger, many perished with cold, and some were caught in France and sold.

In the year 1535 Nicolas Cleynaert, a Flemish scholar, who was a professor at Salamanca and afterwards the tutor of a Portuguese prince, wrote to his former teacher, Jacobus Latomus,* of Louvain, concerning the state of Portugal:

"Even if I were to offer the fourth part of my income, I could not induce any woman to come and look after my housekeeping. You will ask, of course, how it is I manage to get along. The place is full of slaves. Negroes and captive Moors do all the work, and Portugal is so overstocked with this kind of people that I really believe there are more slaves and slave women in Lisbon than there are free persons. There is hardly a house to be found without at least one female slave to do the rough work, and the rich have many

*Peregrinationum ac de rebus machometicis epistolae elegantissimae. Lovanii, 1550.

slaves, men and women; and I fear that they give a loose rein to their lower impulses, since it is obviously to their advantage to sell the young slaves."

When Tunis was captured (in 1535) by Charles V., great numbers of the inhabitants were reduced to slavery.

Giacomo Perollo never showed himself in the streets of Sciacca without his six gigantic slaves, who marched before him.

Azara, in his *Paraguay*, tells of a bachelor of S. Vincente, in Brazil, who sent 800 slaves to Europe; but it is not said whether these were negroes or native Brazilians.

In the XVII century the French Government still purchased slaves to man the galleys, when the number of convicts was insufficient for the purpose.

When the French settlements on the Barbary coast (Bona, La Calle, Bastion de France, etc.) were recovered, there was a M. Piquet at the head of them, and he gave occasion for so many complaints in his dealings with the people that the Dey of Algiers had to interfere by sending against him an officer with fifty soldiers. Monsieur Piquet enticed them on board ship, overpowered them, and carried them off to Leghorn, where he sold them in the open market. The French Consul sent them home, but the incident shows the existence of a slave-market in Leghorn, in 1640. Monsieur Piquet took the name of Monsieur de la Calle. He returned to France, rich, and no one called him to account.

Nor was it the French Government alone that held slaves. Private persons did the same. When the

French botanist, Tournefort, was travelling in Crete, he fell in with a Turk, who had been the slave of a merchant in Marseilles. The French Levant fleet occasionally kidnapped Mohammedans, just as the Phœnicians stole people in antiquity, and Tournefort says in the *Voyage du Levant, I., p. 67:* "The Turks hardly ventured to show themselves on the island before the departure of the French traders, for, when these landed, they caught the Turks by the beard, and carried them off into slavery."

The Neapolitan Government also held slaves. Overbeck says in his *Pompeji* (3 Aufl., p. 32): "In the year 1764 convicts and Tunisian slaves were employed in the excavations at Pompeii."

It was undoubtedly because of the continual wars with the Barbary States that slavery and the slave-trade lasted so long in the Christian countries on the Mediterranean. The Christians, like the Moors, made piratical voyages, and the slave-marts of Algiers and Tunis had their Christian counterparts; and the Christian governments sold the prisoners taken in war. In 1607, when France was at war with the Moors of Barbary, the city of Algiers was attacked and destroyed by six Florentine and five French galleys, and 1,800 of the inhabitants were carried off and sold into slavery. Christians and Mohammedans alike treated their slaves with inhumanity.

It caused no scandal among Christian men to enslave Mohammedans. When the Great Elector (who reigned 1640–1688) established his factories on the Guinea coast, he instructed his admiral to look out for Turkish vessels, and to sell their crews in Lisbon.

ALPINE CLUB AT ODESSA.—A Crimean Alpine Club has just been founded at Odessa. Its objects are: to explore the mountains of the Crimea; to publish scientific researches; to promote and to encourage excursions of travellers, artists and naturalists; to aid the development of agriculture and horticulture, and the local industries of the mountaineers; and to protect the rare species of animals and mountain plants. The Secretary of the Club is Mr. Fr. Kamienski, Professor of Botany in the University of Odessa.

A COMMERCIAL EXPLORATION IN INDO-CHINA.—Mr. Paul Macey, in a communication, printed in the *Bulletin de la Société de Géographie de Paris, No. 1, 1892,* describes the results of his two years' exploration, endlong and overthwart, in the Indo-Chinese peninsula. He travelled in all about 12,100 kilometres, or nearly 7,500 miles. His commercial objects, such as the establishment of depots and counting-houses and the introduction of French goods, seem to have been attained; and his experience satisfied him that the circuit of French Indo-China, from Saïgon along the coast of Anam to Tonkin, and thence by the Black River, the Nam-Hou and the Mekong back to Saïgon, could be made in 76 days, 71 of them on navigable waters. The travel by land had the charm of variety, in the continued changes from walking to riding on horseback or in ox-carts.

The great rapids of the Mekong do not seem to have delayed Mr. Macey. He says: "We reached the island of Kong (at the rapids) on the 17th of August. The passage below the rapids was accomplished without any

difficulty, by carrying the goods across the island, through rice-fields, for a distance of 1,800 metres (1 2-15 miles) in a straight line. Considering the nature of the soil and the character of the currents in the tangle of islets in mid-stream at this point, I studied the plan of a canal to allow of the passage of boats during the greater part of the year, without trans-shipment of cargoes. The line of this canal would lead directly across the rice-fields from the point where the boats now discharge cargoes to that at which they are reloaded; and the construction of the work would cost no great sum."

The Scientific Commission, appointed to study the question of facilitating the navigation of the Mekong, seems, according to the *Annales de Géographie* of January 15, to have arrived at the conclusion that the Kong rapids present an insurmountable barrier to the passage of steamers up-stream; and the proposition is now made to take the steamers to pieces below the rapids, transport them across the island, and put them together again on the other side.

This conclusion is opposed to the account given, at a meeting of the Paris Geographical Society, on the 5th of December, by Mr. Em. Pelletier, who declared that he, in company with Mr. Mougeot, had made a special study of the question on the river itself, and had discovered a channel, practicable for steamboats.

In February, 1891, Mr. Macey set out from Ban-La-Hane with the first Franco-Chinese caravan to travel on the routes of the Muong-Lu and the great roads towards Yunnan. He found that, among the roads which lead down from Yunnan towards the centre of

Muong-Lu and Luang-Prabang, or towards Laï-Chau, several are 1.80 metre (very nearly 6 ft.) in width, paved with stone, even in the mountains, and provided with cemented stone drinking-troughs for pack-animals. There are, also, considerable remains, often of several hundreds of metres in length, of stone bridge, both straight and diagonal, with vaulted arches, resting on stone foundations and supported by piers constructed of stones regularly fitted and cemented. These bridges, which are hundreds of years old, are the work of the Chinese. On many of the hill-tops stand monuments of chiselled stone, adorned with sculptures, and the numerous carved tombstones prove by their dates that, two hundred years ago, there were populous Chinese settlements in these districts.

On his way to Vinh, on the Gulf of Tonquin, Mr. Macey waited some days for an escort at a place called Nong-Ma, and employed the time in instructing the people in the art of extracting and preparing india-rubber. Although the trees and vines, which yield the rubber, abound in the valleys, the people of the country knew nothing of its value, and Mr. Macey believes that he has organized a new industry in the colony.

THE PAMIRS.—Capt. F. E. Younghusband lately read before the Royal Geographical Society a paper on his "Journeys in the Pamirs and Adjacent Countries," performed in the years 1889 and 1890. The paper is reported in part in *Nature*, of February 11 :

"The country," he said, "which I now wish to describe to you is that mountainous region lying to the north of Kashmir, which, from the height, the vastness,

and the grandeur of the mountains, seems to form the culminating point of western Asia. When that great compression in nature took place this seems to have been the point at which the great solid crust of the earth was crunched and crushed together to the greatest extent, and what must have formerly been level, peaceful plains such as we see to the present day on either hand, in India and in Turkistan, were pressed and upheaved into these mighty mountains, the highest peaks of which are only a few hundred feet lower than Mount Everest, the loftiest point on this earth. It was amongst the peaks and passes, the glaciers and torrents of this awe-inspiring region, and anon over the plain-like valleys and by the still, quiet lakes of the Pamirs that my fate led me in the journeys which I have now come before you to describe."

Starting from Leh, in Lahak, Captain Younghusband's first objective point was Shahidula. This place is situated on the trade route to Yarkand, and is 240 miles distant from Leh. This he left on Sept. 3, to explore the country up to the Tagh-dum-bash Pamir.

The route now led up the valley of a river, on which were several patches of fine grazing land. The year before this place had been inhabited; it was now deserted on account of Kanjuti raids. The valley is known by the name of Khál Chuskún. Chuskún in Turki means resting-place, and Khál is the name of a holy man from Bokhara, who is said to have rested here many years ago. The mountains bounding the north of this valley are very bold and rugged, with fine upstanding peaks and glaciers; but the range to the south, which Hayward calls the Aktágh Range, was somewhat tame in

character, with round mild summits and no glaciers. The Sokhbulák is an easy pass, and from its summit to the east could be seen the snowy range of the western Kuenlun Mountains, while to the west appeared a rocky mass, culminating in three fine snowy peaks, belonging to the Aghil Range, which is separated from the Mustagh Mountains by the valley of the Oprang River.

On Sept. 11, the party crossed the remarkable depression known as the Aghil Pass.

"From here is obtained one of the grandest views it is possible to conceive; to the southwest you look up the valley of the Oprang River, which is bounded on either side by ranges of magnificent snowy mountains, rising abruptly from either bank, and far away in the distance could be seen the end of an immense glacier flowing down from the main range of the Mustagh Mountains. This scene was even more wild and bold than I had remembered it on my former journey, the mountains rising up tier upon tier in a succession of sharp, needle-like peaks, bewildering the eye by their number, and then in the background lie the great ice mountains—white, cold and relentless, defying the hardiest traveller to enter their frozen clutches. I determined, however, to venture amongst them to examine the glaciers from which the Oprang River took its rise, and, leaving my escort at the foot of the Aghil Pass, set out on an exploration in that direction. The first march was easy enough, leading over the broad pebbly bed of the Oprang River. Up one of the gorges to the south we caught a magnificent view of the great peak K 2, 28,278 ft. high, and we halted for the night at a spot from which a view of both K 2 and

of the Gushirbrum peaks, four of which are over 26,000 ft., was visible. On the following day our difficulties really began. The first was the great glacier which we had seen from the Aghil Pass; it protruded right across the valley of the Oprang River, nearly touching the cliffs on the right bank; but fortunately the river had kept a way for itself by continually washing away the end of the glacier, which terminated in a great wall of ice 150 to 200 ft. high. This glacier runs down from the Gushirbrum in the distance towering up to a height of over 26,000 ft. The passage round the end of the glacier was not unattended with danger, for the stream was swift and strong, and on my own pony I had to reconnoitre very carefully for points where it was shallow enough to cross, while there was also some fear of fragments from the great ice wall falling down on the top of us when we were passing along close under it. After getting round this obstacle we entered a gravel plain, some three-quarters of a mile broad, and were then encountered by another glacier running across the valley of the Oprang River. This appeared to me to be one of the principal sources of the river, and I determined to ascend it. Another glacier could be seen to the south, and yet a third coming in a south-east direction, and rising apparently not very far from the Kárákorum Pass. We were, therefore, now in an ice-bound region, with glaciers in front of us, glaciers behind us, and glaciers all around us. Heavy snow clouds, too, were unfortunately collecting to increase our difficulties, and I felt that we should have a hard task before us. On first looking at one of these glaciers it would appear impossible to take ponies up them,

but the sides are always covered with moraine, and my experience in the exploration of the Mustagh Pass in 1887 showed that, by carefully reconnoitring ahead, it was generally possible to take the ponies for a considerable distance at least up such glaciers; and as the one we had now reached seemed no worse than others, and there appeared a gap in the range which looked as if it might be a pass, I took my ponies on, and after three days' scrambling on the ice, reached the foot of the supposed pass, and started at 3:30 on the following morning to find if it was at all practicable."

He was making towards a ravine, and was just rounding an icy slope, when there came a report like thunder, and then a rushing sound. It was an avalanche, coming from straight above the party. "I felt in that moment," says Capt. Younghusband, "greater fear than I ever yet have done, for we could see nothing, but only heard this tremendous rushing sound coming down upon us." Preceded by a cloud of snow dust, the avalanche swept past in the ravine. The ascent was continued for some distance, but ended abruptly at the edge of a great chasm, with perpendicular walls of solid ice, and the party turned back, having climbed to a height of 17,000 ft. It was snowing heavily when they reached the glacier, and the reports of avalanches were heard all around in the mountains, which were extremely rugged and precipitous, many of those in the western, or main, Mustagh Range being from 24,000 to 28,000 ft. in height. The glacier was vast:

"The length of this glacier is 18 miles, and its average breadth half a mile; it is fed by three smaller glaciers on the west and one on the east. At its upper

part, immediately under the pass, it is a smooth undulating snow field about a mile and a half in width. Lower down this *névé* is split up into crevasses, which increase in size the further down we get. Then the surface gradually breaks up into a mass of ice domes, which lower down become sharp, needle-like pinnacles of pure white ice. On each side lateral gravel moraines appear, and other glaciers join, each with its centre of white ice peaks and its lateral moraines, and preserving each its own distinct course down the valley, until some three miles from its termination in the Oprang River, when the ice peaks are all melted down and the glacier presents the appearance of a billowy mass of moraine, and would look like a vast collection of gravel heaps, were it not that you see, here and there, a cave or a cliff of ice, showing that the gravel forms really only a very thin coating on the surface, and that beneath is all pure solid ice. This ice is of opaque white, and not so green and transparent as other glaciers I have seen, and the snow at the head of the glacier was different from any I have seen before ; for beneath the surface, or when it was formed into lumps, it was of the most lovely pale transparent blue. I must mention, too, that every flake of snow that fell in the storm was a perfect hexagonal star, most beautiful and delicate in form. The mountains on either side of the valley, especially on the eastern side, are extremely rugged and precipitous, forming little or no resting place for the snow, which drains off immediately into the glacier below."

From the junction of the Oprang and the Raskam rivers, the party started for the Tagh-dum-bash Pamir, crossing an easy pass, 14,600 ft. high. Here they were

in broad, grass-grown valleys. This was the first sight of the Pamir. A bitter cold wind greeted the travellers as they descended from the pass, and it never ceased for an hour during the three weeks spent on the Tagh-dum-bash.

In the little Hunza, or Kanjut, State, Capt. Younghusband was well received by the Chief, Safder Ali Khan, who had a few years before murdered his father, poisoned his mother, and thrown his two brothers over precipices. These exploits the chief reported to his suzerain, the Maharajah of Kashmir, in the following words: "By the grace of God and the decree of fate my father and I fell out. I took the initiative and settled the matter, and have placed myself on the throne of my ancestors." Being asked whether he had visited India, Ali Khan replied that great kings, like Alexander and himself, never left their own dominions.

The people of Hunza live in walled villages.

In his second journey Capt Younghusband started from Yarkand, accompanied by Mr. Macartney.

Approached from this side, the Pamir mountains seem to rise suddenly out of the plain from a height of 4,000 ft. above sea-level to over 25,000 ft. at the loftiest summits. Mounting this wall, the traveller comes to the Bam-i-dunya, the Roof, or as Capt. Younghusband translates it, the Upper Story of the World.

The Pamirs are the broad, open valleys, separated by comparatively low ranges of mountains. In the Hindu Kush and Himalayan region the valleys, as a rule, are deep and narrow, and shut in; but on the Roof of the World they have been filled up faster than the rainfall has been able to wash them out, so that their

bottoms are sometimes four or five miles broad, nearly level and of considerable height above the sea. The Tagh-dum-bash Pamir runs as low as 10,300 ft., but, on the other hand, at the upper extremity its height is over 15,000 ft.; and the other Pamirs vary from 12,000 or 13,000 to 14,000 ft.—an elevation level with the summits of the Alps.

The climate is very severe. Capt. Younghusband says: "I have only been there in the autumn . . . in three successive years, and have seen ice in the basin of my tent in August. I have seen the thermometer at zero (Fahr.) at the end of September, and 18° below at the end of October. The snow on the valley bottoms does not clear away before May is well advanced. June and July and the beginning of August are said to be pleasant, though with chilly nights; and then . . . autumn commences."

The travellers advanced up the long, gravel desert slopes which lead out of the plains of Turkistan, and then through the lower, outer ranges of hills covered with a thick deposit of mud and clay, which Capt. Younghusband believes to be the dust of the desert, which is ever present in the well-known haze of Turkistan; then over the Kara-dawan, Kizil-dawan, and Torat Passes; through the Tangitar defile, and over the Tagarma Plain, to the neighborhood of Tash-Kurgan.

They struck the Alichur Pamir at its eastern extremity, and from there they looked down a valley, averaging four or five miles in width, to some snowy peaks overhanging Lake Yeshil-kul at its western extremity. The range bounding this Pamir on the north is free of

snow in summer, but that separating it from the Great Pamir is always covered with snow, and the passes are difficult. Traces of ancient glaciers are very frequent, and the western end near Lake Yeshil-kul is choked up with their moraines, forming a sea of gravel mounds, in the hollows of which numerous lesser lakes may be seen. On the borders of Yeshil-kul, at a place called Somatash, Captain Younghusband found the fragments of a stone bearing an ancient inscription in Turki, Chinese, and Manchu. This interesting relic, as far as Captain Younghusband has been able to get the rubbings he took of it translated, refers to the expulsion of the two Khojas from Kashgar by the Chinese in 1759, and relates how they were pursued to the Badakhshan frontier.

From the Ak-su Valley the two travellers ascended the sterile valley of the Ak-baital, which at this season of the year (October) has no water in it, and visited Lake Rangkul. "On the edge of this lake is a prominent outstanding rock, in which there is a cave with what appears to be a perpetual light burning in it. This rock is called by the natives Chiragh-tash, *i.e.*, the Lamp Rock, and they account for the light by saying that it comes from the eye of a dragon which lives in the cave. This interesting rock naturally excited my curiosity. From below I could see the light quite distinctly, and it seemed to come from some phosphorescent substance. I asked the Kirghiz if any one had ever entered the cave, and they replied that no one would dare to risk the anger of the dragon. My Afghan orderly, however, had as little belief in dragons as I had, and we set off to scale the cliff together, and

by dint of taking off our boots and scrambling up the rocks, very much like cats, we managed to reach the mouth of the cave, and on gaining an entrance found that the light came neither from the eye of a dragon nor from any phosphorescent substance, but from the usual source of light—the sun. The cave, in fact, extended to the other side of the rock, thus forming a hole right through it. From below, however, you cannot see this, but only the roof of the cavern, which, being covered with a lime deposit, reflects a peculiar description of light. Whether the superstitious Kirghiz will believe this or not I cannot say, but I think the probability is that they will prefer to trust to the old traditions of their forefathers rather than the wild story of a hare-brained stranger. The water of the Rang-kul is salt, and the color is a beautiful clear blue. The mountains in the vicinity are low, rounded, and uninteresting, though from the eastern end a fine view of the great snowy Tagarma Peak may be obtained."

The winter was spent in Kashgar, and Capt. Younghusband returned to India in the summer.

Exploration of the Karakoram Glaciers.—A party, led by Mr. W. Martin Conway, has left England for Karachi, from which place it will proceed by way of Abbottabad and Kashmir to the frontier of Eastern Turkistan.

Mr. Conway proposes to make scientific collections and to study the glacial phenomena, and, especially to survey the great Baltoro glacier, which descends from the peak, known as "K 2" (28,265 ft. high), the second highest mountain in the world.

The glacier-system of the Karakoram range is believed to be the largest in the world, outside of the Arctic and Antarctic regions, and part of it, including the Baltoro glacier, was surveyed in 1860–61 by Capt. Godwin-Austen, of the Great Trigonometrical Survey of India. Lieut. Younghusband saw this peak in 1886 from the Sarpo Laggo Valley, and described it to the Royal Geographical Society, in 1888, as follows:

"After ascending it (the valley) for a few miles, we came in full view of the great peak, K 2, the second highest mountain in the world, 28,250 ft. in height. We could see it through a break in the mountains rising up straight, bold and solitary, covered from foot to summit with perpetual snow. The upper part, for perhaps 5,000 ft., was a perfect cone, and seems to be composed almost entirely of ice and snow, the accumulation of ages. The lower part was more precipitous, but steep enough to throw off the snow altogether, while at the base was a great glacier, formed by the masses of snow, which fell from its sides."

Capt. (now Lieut.-Colonel) Godwin-Austen was present at the reading of Lieut. Younghusband's paper, and must have been gratified at Gen. Walker's proposition, seconded by Sir Henry Rawlinson, to bestow the name of Godwin-Austen upon the peak K 2. The name does not seem to have established itself in English usage, but it finds a place in Stieler's map of India.

It is said that Mr. Conway and his companions will make an attempt to ascend this mountain.

Northern Korea.—Mr. Charles W. Campbell, of

H. B. M's Consular Service, China, read before the Royal Geographical Society, in January, a paper on "A Journey Through North Korea to the Ch'ang-pai Shan." Mr. Campbell left Seul Aug. 31, 1889, and followed the northern highway to Wen-San, where he turned off to visit the Keum Kang San, or Diamond Mountains, in which is a notable collection of Buddhist monasteries. These mountains are a remarkable section of the main range on the east coast of Korea. In the north of the Kang-wen province the range, elsewhere tame, suddenly becomes a towering mass of irregular, precipitous rocks. They occupy a well-defined district 30 miles long by 20 miles broad. At the foot of the Diamond Mountains is the monastery of Ch'ang-An Sa, (Temple of Eternal Rest), said to have been restored, or rebuilt, at the beginning of the VI century; and the tradition, at the monastery, dated the oldest relics from the T'ang period, A.D. 618-907. At the present time there are scattered over the slopes of the mountains upwards of forty shrines, tended by 300 or 400 monks, a few nuns, and a host of lay servitors. There are four chief monasteries, in which most of the monks are gathered, and the nuns possess one or two sanctuaries, spending a part of their time in weaving cotton and hempen garments.

The monks travel over the country, with alms-bowl in hand, chanting from door to door, begging money for a new altar or the repair of an old one, as well as their food and lodging. Mr. Campbell could not say much in favor of these monks. They were ignorant, even of their religion and its history, and they were not held in respect by the people.

The scenery of the Diamond Mountains made a strong impression. Mr. Campbell's route followed a torrent up the west slope to the watershed, 4,200 ft. above the sea, and descended the eastern flank. The monastery of Ch'ang-An stood on a semi-circular space of level ground, a little way up the western slope. The hill in the background was green with trees and shrubs, and in front of the temple the water swirled through rough, tumbled granite blocks, with here and there a clear pool; and beyond rose a conical buttress of the mountain, clothed for half its height with pines and tangled undergrowth. Above, the bare cliff was split vertically by seams and cracks, which produced the effect of immense organ pipes. The topmost ribs were almost perpendicular, and gleamed bare and blue in the evening sun.

After crossing the mountains, Mr. Campbell followed the coast northward for six days, passing through a number of populous towns. Turning inland at Pak-ch'eng he reached the crest of the range that fringes the highlands of North Korea, and made his way back to Seul through Kap-San, Po-Ch'en and the Tei-mun Ryeng (Great Gate Range, or Pass), which divides the Yalu-Kiang from the Sungari basin.

THE JAPANESE EARTHQUAKE OF OCTOBER 28, 1891.—The official estimate of the losses by this great earthquake is about ten million dollars. The prefectures of Gifu and Aichi have not ceased to be shaken; and the report of the destruction caused in Gifu is: Lives lost, 4,957; houses entirely ruined, 51,006; houses burned, 4,431; houses partially ruined, 33,456; houses partially burned, 23.

Investigations made by the Central Meteorological Observatory in Tokyo show that the cause of the earthquake was the subsidence of an area of about two-and-a-half miles in diameter in the north west of the province of Mino, on the shore of Lake Biwa. The earthwave created extended to the surrounding provinces. The celebrated mountain, Fusiyama, has suffered. The south-western slope of the summit has disappeared, through the sinking of an area, 4,000 feet long, 2,000 feet wide and 1,000 feet in depth.

THE EGYPTIAN SUDAN.—The London *Times*, of Feb. 2, reports at length the information concerning the Sudan furnished by Father Ohrwalder, the Austrian missionary, who, with two nuns, succeeded recently in making his escape from the Mahdists.

It is believed that three-fifths of the entire population have been destroyed, and disease still carries off large numbers, though supplies are plentiful and the wells are full of water.

There had been fighting with the Shilluks in Fashoda, and they had been driven to their strongholds; but they are not subdued and Zaki, who commands against them, dares not go far from the Nile. Zaki's force is strong enough to check any movement of Emin Pasha to the northward from Wadelai, which he is said to have entered. Bahr el Ghazal is entirely deserted by the Dervishes.

Dar-Fur is practically abandoned, for Ahmed Mahmud, the Khalifa's cousin, who was in command at El Fasher, has thought it prudent to retreat to El Obeid, and this place forms, therefore, the extreme western limit of the Khalifa's authority.

Dongola is held by a force of 3,000 men, with six mountain-guns, one machine gun, and a fair supply of ammunition.

In the Eastern Sudan the Dervishes still hold their ground, though the battle fought at Tokar in February, 1891, has stopped the advance of the Khalifa's power. Father Ohrwalder thinks that, for the present, the defensive attitude will be maintained.

At Kassala there was a state of revolt among the neighboring Arabs. Abu Girgeh was in command in the town, with a force of 1,100 men, and a reinforcement of 3,000 men was to be despatched from Omdurman, to strengthen Kassala against the Italians. There is little trade at Kassala, the commerce between the Sudan and Massaua passing through Gedaref.

The prisoners in and around Omdurman number about 75 Europeans—men, women and children—500 Copts and about 1,500 Mohammedan Egyptians. Among the Europeans are Slatin and Neufeld, and Victoria, the daughter of Georghi Bey. Ernest Marno's son is still alive, and the two children of Joseph Klein live in great poverty with their mother. Giuseppe Cuzzi, now very old, draws $7 a month; and Pietro Moratori, a Pisan, who has spent forty-two years in the Sudan, works as a mason and builder. There are, also, 22 Greeks (3 of them women), 10 Syrians (2 women), 8 Jews and 3 Jewesses, and, in all, 20 children of various nationalities.

Down in Egypt.—Luzac & Co.'s Oriental List, Vol. II., No. 10, records a new Oriental book, published in America, with this title:

"From Timber to Town, Down in Egypt.—A Dialect Story by an Early Settler, 16 mo., Chicago, 1891."

The scene of this dialect story is laid, not on the banks of the Nile, but in the State of Illinois. The lower part of that State is familiarly known as Egypt, and Webster's Dictionary (ed. 1877), p. 1558, explains the name, as follows:

"EGYPT." A cant, popular designation of the southern portion of the State of Illinois—being a figurative allusion to the thick darkness in which ancient Egypt was involved for three days in the time of Moses.

The inhabitants of Southern Illinois have had the general reputation of being extremely ignorant."

It is not Webster himself, but Mr. William A. Wheeler, who is responsible for this explanation.

FRENCH GUINEA.—The French Government has established a protectorate over the Gold and the Ivory Coasts of Guinea, from Assini, on the east, to the river Cavally. on the west, and extending inland to the states of the Samory and of Tieba. Dr. Ballay has been appointed governor of this new colony, which is to be known as "French Guinea."

ZIMBABWE.—Mr. J. Theodore Bent has made public the result of his explorations at Zimbabwe and at other points in Mashonaland. At Zimbabwe, which lies in S. Lat. 20° 16′ 30″ and E. Long. 31° 10′ 10″, at an elevation of 3,300 ft. above the sea, the work was carried on through the months of June, July and part of August, 1891, beginning with the large phallic temple at the foot of the hill. The character of the temple was

shown by the symbol marked in stone on the solid round tower, the encircling wall, the *discus*, and by the decorated objects found in the excavations.

This circular building was for centuries the Zimbabwe, or royal kraal, of the Kaffir emperors, called by the dynastic term of Monomatapa. Each separate chief of the race had his own Zimbabwe. Even now the natives speak of the lower building as "Zimbabwe," and of the fortress on the adjacent hill as "the walls," or "the ruins."

The work on the fortress laid bare the narrow approach from the plain through two tortuous walls, protected by traverses, ambuscades, and every conceivable form of defence; this led up to a narrow gulley between the sides of a split granite boulder, up which a set of steps led to a parapet above the precipice of granite. On this summit, a very elaborate system of fortification had been erected; a wall 13 ft. thick and 30 ft. high runs along the edge of a sheer precipice 90 ft. in height. The wall is surmounted by monoliths alternating with small round towers, and is again protected by an inner wall, allowing of only a narrow passage. In this place were found a fine barbed copper spearhead and "several implements of war"; so Mr. Bent calls them. The upper part of this fortress was adorned with huge monoliths and decorated beams of soapstone, one 13 ft. in height. The patterns were of a geometric character.

The temple of the fortress, now used as a cattle kraal, looked, like the temple at the base, to the south-east. It was supported by a system of under walls, and was approached by a narrow passage and a staircase,

the steps of which were formed by a continuation of the rounded courses of the outer wall. The semi-circular outer wall had been decorated by carved birds on the top of soapstone pedestals, five or six ft. high. Five were found, all different; one bore on its pedestal and wings the characteristic symbol, and one only had its beak uninjured, the beak of a vulture or raven. Iron bells of a "curious form" (Mr. Bent is not given to precision) were found near these birds.

In the middle of the building was an altar, built of small granite blocks, which fell apart when disturbed, and here, also, were more realistic objects in soapstone. Adjoining the temple were two caves, which yielded fragments of soapstone bowls and pottery, a gilt spear-head, more "implements of war," and pieces of Persian and celadon china. The bowls were decorated—one piece showing a man with an arrow, pursuing zebras, and dragging behind him in a leash a dog, which turns toward two hippopotami. The pottery was well-glazed and decorated with geometric patterns.

Close underneath the temple was a gold-smelting furnace made of very hard cement. Around it were crucibles, also of cement, in which were still fixed many dots of gold, about the size of a pin's head. In a chasm hard by was a heap of the quartz. Tools for removing the gold from the furnaces, burnishers, crushers, etc., were also found.

Mr. Bent says that the whole country from the Lundi to the Zambezi is studded with ruins, similar to those of Zimbabwe. One of these, called Mattindaila by the natives, lies 64 miles north-east of Zimbabwe. The ruins stand on a gentle, granite eminence; and they

were, apparently, the centre of a line of forts extending for many miles. The area enclosed is almost as large as the circular building of Zimbabwe; but there was no sign of a round tower, and the walls were much injured. One pattern runs for a space outside the wall, then for a corresponding space on the inside, and then again on the outside. This pattern is similar to one on a fort by the Lundi, while another is identical with a Zimbabwe pattern. Over the chief entrance the pattern ran as a sort of lintel and above it was a set of loopholes, one still perfect. The patterns and the most substantial part of the building faced the south-east. The interior was divided by cross walls, and was full of gigantic baobab trees. The entrances were curious, being all triple and squared at the corners, not rounded, like those at Zimbabwe; and all the entrances were walled up.

There were smaller buildings near by and numerous circular foundations of regularly-built granite blocks, of from 6 to 15 feet in diameter.

Another equally good fort was visited in the Mayzoe gold fields; and others were found still further to the eastward. Beyond these, at Massikesse, are buildings of Portuguese construction.

In an address before the Royal Geographical Society, on the 22d of February, Mr. Bent declared his conviction that the ruins in Mashonaland were not in any way connected with any known African race, and that the objects of art and the special cult were altogether foreign to the country. It was clear to him that the ruins had formed a garrison for the protection of a gold-producing race in remote antiquity. This race he found in Arabia, and he concluded that Africa furnished the

gold, so often spoken of as "Arabian" by ancient writers. Furthermore, a cult practised in Arabia in ancient times was also practised at Zimbabwe; and hence there is little room for doubt that the builders and workers of the great Zimbabwe came from the Arabian peninsula.

There is no improbability in this conclusion, though it is reached *per saltum*, rather than by a logical process. Allusions to Arabian treasures and to India, in the writers of antiquity, are not always to be taken in a definite geographical sense; and there is no force in the argument from the cult, for this had its home in every region of the earth.

THE ELDER WEST AUSTRALIAN EXPEDITION.—Mr. Henry Greffrath* contributes to *Petermanns Mitteilungen, 38 Band, I*, the substance of despatches sent from Esperance Bay by Mr. Lindsay, the leader of the West Australian Expedition, to the Geographical Societies of Adelaide and Melbourne.

Mr. Lindsay says: West of the Everard Range, S. Lat. 27° 9′, E. Long. 132° 28′, it rained so hard for a stretch of 80 kilometres (50 miles) that the camels had great difficulty in struggling through the heavy ground. Fort Mueller, in S. Lat. 26° 10′, E. Long. 128° 0′, was completely dry and showed no sign of the intermittent spring, for which Giles took it, in his journey in 1876. The highest temperature observed in the shade was

*This gentleman begins his communication with the gracious words: "The expedition, equipped in Adelaide by the wholesale merchant and squatter, Sir Thomas Elder, etc." (Die von dem Grosskaufmann und Squatter, Sir Thomas Elder in Adelaide ausgerüstete . . . Expedition, u. s. w.).

Mr. Greffrath's implied preference for the retail trade is a matter of taste.

35½° Centigrade (96° Fahr.). The region west of the South Australian boundary consists of sand hills covered with acacia-bush (mulga) and grass, sandy plains with abundant spinifex and hills of granite and diorite, rising singly or in groups, and, farther south, of sandstone hills and a belt of desert gum trees. Nowhere a lasting supply of water. The still numerous natives seemed to be friendly, but they were shy and kept at a distance.

From Barrow Range, S. Lat. 26° 0′, E. Long. 127° 7′, where one of the camels died, to Ninety-Gallon Rock Hole, S. Lat. 27° 40′, E. Long. 126° 0′, there were continuous, regular sand hills, covered with spinifex, and with hardly any other vegetation. There was almost no water in the rock hollows, and, according to appearances, there had been no rain for two years. Here the natives were hostile and there was a collision with them, but, happily, without resort to firearms. Parties sent out from the camp brought back always the same report of sand and sandstone hills, spinifex and no water.

From the Ninety-Gallon Rock Hole a march to the south-west, over a country in which the sand hills were less frequent, lower and more irregular, led to Queen Victoria Springs, discovered by Giles in 1875, in S. Lat. 30° 23′, E. Long. 123° 17′. According to Mr. Lindsay, these springs, reached on September 23, by no means deserve their stately name. Part of the journey in this direction lay for miles through a forest of eucalyptus trees, with undergrowth of scrub and spinifex. Neither grass, nor birds, nor animals were seen. The camels suffered over a stretch of burnt

country before they came to Queen Victoria Springs. There was no trace of Giles's earlier line of route. The savages hardly showed themselves, but Mr. Lindsay reports that they practise tattooing and circumcision, and that their weapons are spears, boomerangs and waddies, or war clubs. A second camel died. A plant, said by Giles to be poisonous, was found to be innocent. No minerals were observed, but a collection of 10,000 species of plants was made and forwarded from Esperance Bay to Baron von Mueller, at Melbourne.

Of the forty-two camels, two died and a third had to be abandoned; the rest reached the coast in a pitiable condition. Three new camels were bought at Esperance Bay. The members of the expedition were fairly well, though one, C. A. Bowden, had died of inflammation of the lungs on the 8th of May. Two of the party, not well suited to the work, were sent home, and an experienced camel driver was brought from Adelaide, and a fresh start was made to the north and north-west to the source of the Murchison River, which enters the sea in S. Lat. 27° 35′, E. Long. 114° 4′. Unfortunately, it was learned that an extraordinary drought prevailed in that direction, and this foredoomed the attempt to failure.

A short cable despatch mentioned in December that it was found impossible to push on to the north. The expedition had turned back into the settled parts of West Australia to the town of York, in S. Lat. 31° 53′ 15″, E. Long. 116° 47′ 15″, and, according to a later telegram, a new start was to be made from that place.

OBITUARIES.

MAJ.-GEN. GEORGE W. CULLUM,

U. S. ARMY.

Born February 25, 1809.
Died February 28, 1892.

GEN. CULLUM was a native of New York. He entered the U. S. Military Academy by appointment from Pennsylvania, in 1829, and was graduated in 1833. He was almost immediately assigned to duty as assistant engineer in the construction of Fort Adams, Newport, Rhode Island; and within the next ten or twelve years he superintended the building of Fort Trumbull and Battery Griswold in New London Harbor, and Forts Independence, Warren and Winthrop in Boston Harbor. During the Mexican War he was engaged in recruiting duty and as superintending engineer in devising pontoon trains; and at the close of the war he was sent to West Point, where he remained till 1850, when his health gave way, and he went abroad on leave of absence, in the belief that he should never see his native land

again. The climate of Egypt completely restored him, and he spent nearly two years in travel in the Old World.

Upon his return to active duty he was made instructor in practical engineering at West Point, and was afterwards sent to Charleston, South Carolina, where he was engaged for some years in building. Fort Sumter and in repairing Castle Pinckney and Fort Moultrie.

In 1858 he was a member of the Board on the defences of New York Harbor. At the outbreak of the War in 1861 he was appointed successively aide-de-camp to Gen. Scott, chief engineer of the Department of the Missouri, and chief of staff to Gen. Halleck; and he was for four years a member of the U. S. Sanitary Commission. At the close of the War he was made Superintendent of the U. S. Military Academy, a post which he resigned in the autumn of 1866. From 1867 to 1874, when he was retired on account of age, he sat as a member of the Board for improving the defences of New York Harbor.

Gen. Cullum became a Fellow of the American Geographical Society in 1869. and was one of its Vice-Presidents from 1877 to

1892; and he bore his full share of responsibility in the active administration of its affairs. His professional training had taught him the value of attention to details, as means to the attainment of a great result. Quiet and undemonstrative in manner, he held decided opinions, and was always ready to maintain them with a firmness that marked, also, his uprightness and his devotion to duty. Those who were more intimately associated with him learned to appreciate the philosophical temper, which strangers mistook for indifference, and the abiding sense of humor that made him a genial companion.

Gen. Cullum was an industrious and careful writer, and he has left behind him many papers on military, geographical and historical subjects. His *magnum opus* was the "Biographical Register of the Officers and Graduates of the United States Military Academy, from 1802 to 1850." The third edition of this work, enlarged to three volumes and brought down to January, 1891, was happily issued from the press early in that year.

To the U. S. Military Academy Gen. Cullum left $250,000 for the construction

of a Memorial Hall, and $20,000 for the purchase of statues and portraits.

To the American Geographical Society he bequeathed the sum of $100,000 for the erection of a fire-proof building for its library and collections; and a further sum of $5,000, the interest of which is to furnish the Society's Gold Medal, to be conferred upon the explorer most worthy of the distinction.

The following Resolution was unanimously adopted at a meeting of the Society, held March 14, 1892:

RESOLVED, That in the death of our First Vice-President, Major-General George W. Cullum, U. S. Army, this Society has lost one of the most eminent, useful and devoted of its members. No one who has been connected with it during the forty years of its existence had a more comprehensive view of the importance of the inquiries to which its labors have been directed, or saw more clearly how much it might accomplish for the benefit of mankind, if its resources were adequate to the great field before it. For the seventeen years during which he acted as Vice-President, his efforts were untiring to make it what it ought to be, and what he believed it would ultimately become. He took upon himself a large share of those executive labors that are indispensable to the successful management of such an institution, overlooked its extensive correspondence and advised respecting it, gave much of his attention to the publication of the journal, and scarcely a day passed, during those seventeen years, that he did not come to the Society's house to supervise some matter of detail. The narrow limits of a resolution will not admit of an enumeration of all that he has done for our institution. We can only express our deep sense of our loss, our appreciation of his wide and accurate knowledge, and our high regard for him as a man.

DE QUATREFAGES DE BRÉAU.—A letter from the Paris *Société de Géographie* announces the death of its illustrious President, on the 12th of January.

M. de Quatrefages was born at Valleraugue, in the Department of Gard, February 10, 1810.

He studied at Tournon and at Strasburg and, for a time, practised Medicine at Toulouse, where he filled the chair of Zoölogy; but he soon removed to Paris, and devoted himself to scientific studies, and, in particular, to anthropology. His literary activity was great up to the day of his death, and his writings are marked by lucidity, originality, breadth of view and accuracy.

M. de Quatrefages was a member of the Institute and of the Academy of Medicine, editor of the *Journal des Savants*, and professor of the Natural History of Man at the *Muséum*. He was elected President of the *Société de Géographie*, April 25, 1890.

THE GRAND DUKE CONSTANTINE NICOLAÏEVITCH.—A letter from the Imperial Russian Geographical Society brings information of the death, at Pavlovsk, in the night of January 24-25, of its President, H. I. H. the Grand Duke Constantine Nicolaïevitch, for more than twenty years an Honorary Member of the American Geographical Society.

Constantine was the second son of the Emperor Nicholas, and was educated for the naval service with great care under Admiral Lütke, the circumnavigator of the globe.

He was twice President of the Council of the Empire, and for many years Grand Admiral of the Imper-

ial Navy; but two years ago his health gave way, and he had since lived in seclusion under the care of his physicians.

THE DUKE OF DEVONSHIRE.—The following letter brings intelligence of a blow which has fallen upon the Manchester Geographical Society:

44 Brown Street,
MANCHESTER, 28th December, 1891.

Gentlemen:—We have the melancholy duty of informing you of the death of our revered President. His Grace the Duke of Devonshire, K.G., LL.D., D. C.L., F.R.S., died December 21st, 1891, and was buried at Edensor, December 26th.

His Grace was the first President of this Society, and took a warm interest in its welfare. He was a distinguished scholar, the Chancellor of the University of Cambridge, and the Victoria University. It will be difficult to replace him, and we mourn his loss.

Yours respectfully,

ELI SOWERBUTTS,
Secretary.

H. W. BATES, F.R.S.—Mr. Bates, for twenty-seven years the Acting Secretary of the Royal Geographical Society, died in London, February 16, at the age of sixty-seven. He was educated for a mercantile career, but devoted himself to science, and set out in 1848 to explore the valley of the Amazon, where he spent eleven years. His observations are recorded in his book, *The Naturalist on the River Amazons*, approved for all time by Darwin "as the best work of natural history travels ever published in England."

Mr. Bates was, also, the discoverer of the principle of mimicry in the animal world, first pointed out in his paper on "Mimetic Resemblances as illustrated by the Heliconidae."

In the *Proceedings* of the Royal Geographical Society for March several of the Fellows give expression to their admiration of Mr. Bates's character and attainments and their sense of personal bereavement in his death.

LIEUT.-COLONEL JAMES A. GRANT, C.B.—It is thirty years since Speke and Grant, whose names will always be associated, made their famous journey to the source of the Nile, exploring on the way the countries to the west and north-west of the Victoria Nyanza, which Speke had first seen at its southern extremity and named in August, 1858. It was almost four years after (July 28, 1862) that he saw the Nile flowing northward from the great lake and pouring over Ripon Falls. The story of their expedition has been told by both in separate publications, inspired by mutual good-will, the more impressive from its contrast with the unfortunate quarrel between Burton and Speke.

The scientific results of the joint exploration were in a great measure the work of Grant.

He made no second visit to Africa, and men lost sight of him as a living figure in the rear of the younger generation of explorers, so that the announcement of his death came like a surprise.

As a soldier, Col. Grant won distinction and rank in India.

DR. WILHELM JUNKER.—Dr. Junker, who died at

Moscow in February, was a scientific explorer of the highest type.

He was born in Moscow in 1840, and studied successively at Göttingen, St. Petersburg, Berlin and Prague.

He began his African travels with a visit to Tunis, in 1874. The next year he went to Egypt and entered upon the systematic exploration of the Nile countries, extending his journeys to the western tributaries of that river, and the water-shed between its basin and that of the Congo. His farthest western point was 22° 40′ E. Long., up to which he traced the Welle-Makua river, long supposed to be the upper stream of the Shari, which enters from the south into Lake Tchad. Five years after Junker, Van Gèle, in 1888, coming from the west, ascended the Mobangi to a point where a great river flowed into it from the south-east. This river has been practically identified with the Welle-Makua, now shown to be the upper course of the Mobangi.

It was Dr. Junker's method to make his way into the region he wished to explore, and take up his residence among the people for a length of time, learning their language, and studying under these exceptional conditions the ethnology and the natural history of the district, and fixing geographical positions, with or without instruments. Where these were wanting, he went through the monotonous and trying labor of measuring his steps as he travelled, keeping his direction by the sun, and recording at night the distance of the day's march and his positions. The revolt of the Sudan, in 1883, against the authority of Egypt shut up Dr. Junker in Wadelai with Emin Bey.

In 1886 the Russian traveller suddenly appeared at

Zanzibar, like a man returned from the dead, with the tidings of Emin's loyalty to his flag and his pressing need of help. Then followed the tragi-comedy of Stanley's expedition.

Dr. Junker may be said to have died before his time. Men of his stamp do much to redeem the reputation of the white race in Africa.

Louis Ferdinand Alfred Maury.—At the meeting of the Paris *Société de Géographie*, on the 19th of February, the President announced the death of Mr. Alfred Maury, of the Institute, for forty-seven years a Fellow of the *Société*, of which he had been successively Assistant Secretary, Secretary, Vice-President, and one of the Honorary Presidents.

Mr. Maury was a man of vast erudition, and his writings on history, philology, archæology, and geography, are of a very high order.

He was elected a Corresponding Member of the American Geographical Society in 1860.

Sir William Macleay.—The Linnean Society of New South Wales announces in a circular letter the death of Sir Wm. Macleay, one of its oldest and most active members. An extract from the President's Address in January, 1890, recounts the benefactions of Sir William to the Society:

"I must remind you, at least, of his having borne all the expenses of our unfortunately brief establishment in the Garden Palace, of his gift of one admirable library of Natural History, which was to be consumed in the subsequent conflagration, only to be replaced by

the still more costly, extensive, and, I may almost say, invaluable collection which you see upon the shelves around you, and which he is still from day to day expanding and enlarging in all directions. I must also remind you that he has from the time of that fire never ceased to entertain the Society in a home formed for it by his own hospitality—first in an office, then in a commodious dwelling house, and finally in this spacious hall, presented to the Society. . . . Sir William Macleay has borne the greater part of the expenses of the Society's publications, has supplied the salaries of its officers, furnished its specialists with abundant funds for their investigations and their maintenance, and has equipped this establishment with its fittings, furniture and apparatus for research."

The President's statement is supplemented as follows:—By deed of December 5, 1890, the Linnean Hall with the land on which it stands, 179 ft. by 120 ft., was transferred to the Society; by way of endowment there was given a mortgage of £14,000, bearing interest at 5 per cent., and to this was added a bequest of £6,000. The sum of £35,000 was also bequeathed for the establishment of four "Linnean Fellowships," of the annual value of £400 each.

TITLES OF PAPERS IN GEOGRAPHICAL JOURNALS.

BERLIN.—*Verhandlungen der Gesellschaft für Erdkunde.*

The similarity of the Southern Arabian and the Northern Abyssinian Plants (Schweinfurth)—The Geographical Relations of Ecuador and especially those of the Higher Andes (Theo-

dor Wolf)—Report on the International Geographical Congress at Berne (Dr. Foerster)—The Geographical Exhibition at Berne in 1891 (Dr. G. Wegener)—The North American Deserts (Dr. J. Walther)—Some remarks on the Greenland Inland Ice and the Origin of Icebergs (Rink).

Zeitschrift.

The Geographical Extension of Mammals in the Black Earth District on the Right Bank of the Volga, and in adjoining Districts (Prof. Dr. A. Nehring)—Marino Sanuto the Elder and the Maps of Petrus Vesconte (Dr. K. Kretschmer)—A New Map of the World belonging to the Vatican Library (Dr. K. Kretschmer)—The Republics of Central America in 1889 (Dr. H. Polakowsky)—F. Ratzel's Anthropogeography II., or the Geographical Expansion of Man (H. Wagner).

EDINBURGH.—*The Scottish Geographical Magazine.*

Anniversary Address:—The Upper Karun Region and the Bakhtiari Lurs, by Mrs. Bishop, F. R. S. G. S.—The Pamir:—A Geographical and Political Sketch. By E. Delmar Morgan (*with a map*)—The Orthography of Foreign Place-names. By James Burgess, LL.D., C. I. E., etc.—Britannic Confederation, VI. The Consolidation of the British Empire. By Lord Thring, K. C. B. (*with a map*).—The Gran Chaco. By J. Graham Kerr—The Principles of Geography. By Hugh Robert Mill,

D. Sc.—A Journey in Indo-China. By Lord Lamington—The Small Trades of the Caucasus. By Victor Dingelstedt—The Mapping of the United States. By Henry Gannett.

GOTHA.—*Petermanns Mitteilungen.*

The Mombasa-Kilimanjaro route in British East Africa (Dr. Hans Meyer)—The Geographical Nomenclature of Central Asia (A. Vambery)—Cartographical Basis of Kamerun in October, 1891 (H. Habenicht)—An excursion to the Solomon Islands—Prof. H. Pittier's Exploration in the Western Part of Costa Rica (Dr. Polakowsky)—The Forms of Cultivation of the Earth (Dr. Ed. Hahn)—Two Journeys to the Interior of Iceland (Th. Thoroddsen)—Deep Sea Exploration from 1888 to 1890 (Prof. Dr. A. Supan).

LONDON.—*Royal Geographical Society, Proceedings.*

A Journey across the Pamir from North to South. By St. George Littledale—A Journey to Garenganze. By Alfred Sharpe—Memorandum of the Society's New Map of Persia. By the Hon. George Curzon, M. P.—Why Are the Prairies Treeless? By Miller Christy, F. L. S.—Exploration in the Central Caucasus in 1890. By Douglas W. Freshfield, Hon. Sec. R.G.S.—Orthography of Geographical Names—A Journey through North Korea to Ch'Ang Pai Shan. By Charles W. Campbell—Expeditions among the Kachin Tribes on the

North-east Frontier of Upper Burma. Compiled by General J. T. Walker, C.B.,F.R.S.—Views in Circassia, with Notes by the late Admiral Saumarez Brock.

MADRID.—*Sociedad Geográfica de, Boletín.*

Spanish Guinea: On the Mainland and in the Islands of Corisco and the Elobeys (D. José Valero y Belenguer)—Authentic Notices of the Famous River Marañon: Appendices (D. Marcos Jiménez de la Espada)—The Majorcan Cartographers: Angelino Dulcety; Jafudá Cresques (D. Cesáreo Fernández Duro)—Which of the Bahamas is the island denominated "San Salvador" by Columbus? (D. Cesáreo Fernández Duro)—The Partition of Africa, according to the latest treaties: An Address delivered at the Madrid *Ateneo*, May 27, 1891, by D. Rafael Torres Campos—The Galápagos, and other Islands farther to the West (D. Marcos Jiménez de la Espada.)

MANCHESTER.—*Journal of the Manchester Geographical Society.*

The Channel Tunnel. By Prof. Boyd Dawkins, F.R.S., etc.—Armenia. By Prof. Minasse Tcheraz, of King's College, London—British Trade in Central Asia. By Prof. Arminius Vambery—Yoruba. By Mr. Alvan Millson, M.A., F.R.G.S.—The Commercial Products of Central Africa. By Mr. J. Howard Reed—Geography in Newpaspers and

Periodicals—Mexico. By Mr. F. C. Burton —The Children's Home on the Moors at Edgeworth.

PARIS.—*Société de Géographie, Comptes Rendus.*

Maps of Etna, by M. Emile Chaix—Maps of the African Missions—The Royal Geographical Society's Circular on the Orthography of Geographical Names—A MS. Atlas in the Royal Library of Stockholm—Reform of the Calendar—The Growth of London—Dutreuil de Rhins and Grenard in Central Asia—The Niger—Mashonaland—Indian Archæology (in the United States)—The Marowyne Territory (Guiana)—Borneo and Sumatra—Documents laid before the Congress of Americanists by M. Pinard—Mr. R. A. Eekhout on the Malay Archipelago—The death of M. de Quatrefages, President of the *Société* —The Chain of the Vosges and the Rhine Valley—The Centre and South of Tunisia —Railroads in Tunisia—Mr. Lionel Dècle on the Zambezi—The Death of M. Alfred Maury—An Error on the Map of Venezuela (the channel, no longer in existence, between the island of La Brea and the main land)—The Prince of Monaco's voyages in his yacht, *L'Hirondelle*—The Latest Census of France.

Bulletin.

Report on the progress of Geography in the year 1890, by Mr. Ch. Maunoir—The Crossing of Tibet, by G. Bonvalot and Prince Henri d'

Orleans—A Map of America of 1669, attributed to Louis XIV. (J. Marcou)—Note on the Areometer and the Thermometer in Oceanographical Observations—A New Portable Sounding Apparatus in Steel Wire: A Light Drag and fine net for the use of Naturalists and Explorers (E. Belloc)—The Caverns of Sainte-Reine in the canton of Toul.

ROME.—*Società Geografica Italiana, Bollettino.*

From the Interior of New Guinea; A letter of Dr. Loria—From Irupana to Covendo (Prof. L. Balzan)—Some Documents and Studies relating to the Columbian Collection (Prof. C. de Lollis)—Fausto Rughesi's Map of the World (M. Fiorini)—The Ruspoli Expedition—The Elder Expedition—Races in Melanesia—The International Statistical Institute—The International Geodetic Association—The Pelagosa Group (in the Adriatic)—The Botanical Collections of the Bricchetti-Robecchi Expedition—The Loria Expedition in New Guinea—Drawings by Bushmen—Languages Spoken in our Colony (Eritrea)—Landscape in Geography, an address by Prof. F. Porena—In what Language did Pigafetta write his *Relazione*? (Dr. A. Da Mosto)—From Puerto Colombia to Bogotá.

VIENNA.—*Mittheilungen der kais. königl. Geographischen Gesellschaft.*

The Region of the Oder Source (Baron C. V. Cam-

erlander, who died January 17, 1892)—Some Geographical-Prehistorical Parallels (Dr. M. Hoernes).

WASHINGTON.—*The National Geographic Magazine.*

An Expedition to Mt. St. Elias, Alaska, by Israel C. Russell—The Cartography and Observations of Bering's First Voyage, by Gen. A. W. Greely.

WASHINGTON LETTER.

WASHINGTON, MARCH 20, 1892.

ALBATROSS EXPEDITION.—A general sketch of the expedition of the *Albatross* from February to May, 1891, by Alexander Agassiz, is published by permission of the U. S. Fish Commissioner in the first number of the twenty-third volume of the *Bulletin of Comparative Zoology* at Harvard College, dated February, 1892.

Besides the large quantity of scientific results of the various expeditions of the vessels of the U. S. Fish Commission, a great deal of new geography has been given to the world by the same source, chiefly through the intelligence and peculiar fitness for duty of the officers in charge of the Fish Commission's vessels. Prof. Agassiz says: "The more I saw of the *Albatross*, the more I became convinced that her true field is that of exploration. She is a remarkably fine sea boat, and has ample accommodation for a staff of working specialists." Of Lieutenant Commander Tanner he speaks in a highly complimentary manner: "The success of the *Albatross* thus far has depended entirely upon the zeal, energy, intelligence, forethought and devotion of Captain Tanner. . . . In his cruises off the east coast of the United States, and in the Caribbean, to say nothing of his explorations in the Gulf of California, on the coast of California, on the coast of Alaska, and in the Bering Sea, he has accumulated in the *Albatross* endless most interesting material, which no

other ship could have got together unless she had another Tanner in command."

There were three routes in the expedition referred to in this article. *First:* [February 22, '91.] From Panama to Point Mala, and next to Cocos Island, from there in a southerly direction, thence north-westerly to Malpelo Island, and back to the hundred fathom line off the Bay of Panama. *Second:* From Panama to Galera Point, across the Humboldt Current to the southern face of the Galápagos, visiting Chatham, Charles, Duncan, and James Islands; thence to Acapulco. *Third:* From Acapulco into the Gulf of California as far as Cape Corrientes, thence to a point off the Tres Marías, and from there to Guaymas [April 23d]. Eighty-four dredging stations were occupied where the trawl, tangles, and tow-nets were used, and five stations at which the surface and sub-marine tow-nets alone were used.

Prof. Agassiz remarks that there can be no more striking contrast than exists between the topography of the two sides of Central America. The Atlantic side, with the Gulf of Mexico and the Caribbean Sea, has great sub-marine banks extending along Yucatan, Honduras and Venezuela, while on the Pacific side the continental slope is steep, the 2,000 fathom line often coming within 100 miles of the coast line. Concerning the hydrography of the Galápagos region, our knowledge is still quite incomplete. Nothing is known of the depth of the channels between Abingdon and Bindloe and Tower, and no soundings exist to show how far to the westward the deep valley of over 800 fathoms separating Bindloe from Indefatigable extends. There

seems little doubt that the northernmost islands are themselves separated by comparatively deep water, and in turn separated from the north-eastern group by a tongue of the ocean at least 1,000 fathoms in depth. After further observations concerning the fathom lines connecting the different islands Prof. Agassiz says: "We may therefore look upon the Galápagos Islands as a volcanic group, gradually built up by successive flows of lava upon a huge mound, itself perhaps raised by the same agencies from the floor of the ocean."

Another very interesting feature of this expedition was the observation of the great distance from shore to which true terrigenous deposits were carried. While trawling on the second line between the Galápagos and Acapulco there was not a station occupied of which the bottom could be characterized as strictly oceanic. At the most distant points from shore the bottom specimens invariably showed some trace of admixture of terrigenous material. A very fine mud was the characteristic bottom brought up, often very sticky, and enough of it usually remained in the trawl, even when coming up from depths of over 2,000 fathoms, materially to interfere with the assorting of the specimens contained in the hauls. This mud continued all the way from the Galápagos to Acapulco. In none of the dredging on the Atlantic side of the Isthmus, from a depth of over 1,500 fathoms, have such masses of decomposed vegetable matter been found as on this expedition. The deepest sounding of this cruise was at a point somewhat more than half way between Culpepper and Acapulco, being 2,232 fathoms. The surface temperature at this point was 82°, and that of the

bottom 35° 8′; the bottom temperature being below 36° in the whole of the great basin extending between the northerly slope of the Galápagos and the continental slope off Acapulco.

A considerable portion of the "Sketch" of this expedition is devoted to a study of the pelagic faunæ, in which the writer says he has "always been more or less interested." He severely criticises Haeckel's study, and after reviewing the experiments by the *Challenger*, the *Gazelle*, the *Blake*, the *Vettor Pisani*, Dr. Chun, Victor Hensen, and the *Albatross*, in investigating the region of deep sea fauna, he concludes:

"Our experience in the Gulf of California with the Tanner self-closing net would seem to indicate that in a comparatively closed sea, at a small distance from land, there may be a mixture of the surface species with the free-swimming deep sea bottom species, a condition of things which certainly does not exist at sea in deep water, in an oceanic basin at a great distance from shore, where the surface pelagic fauna only descends to a comparatively small depth, *i.e.*, about 200 fathoms, the limits of the depth at which light and heat produce any considerable variation in the physical condition of the water. The other experiments with the Tanner net, made in an oceanic basin on the way to Acapulco from the Galápagos, and to the Galápagos from Cape San Francisco, seem to prove conclusively that in the open sea, even when close to the land, the surface pelagic fauna does not descend far beyond a depth of 200 fathoms, and that there is no intermediate pelagic fauna living between that depth and the bottom, and that even the free-swimming bottom species do not rise

to any great distance, as we found no trace of anything within 60 fathoms from the bottom where it had been fairly populated."

The Galápagos Islands remain to-day as when discovered two centuries ago, uninhabited, with the exception of a colony maintained on Chatham Island.

The topography of each island of the group is detailed with considerable minuteness in the "Sketch." The writer criticises sharply Dr. Baur's views of the origin of the fauna and flora (*Am. Naturalist*, March, April, '91), which, he says, are entirely at variance with what is known of their geological structure. The majority of the islands are formed around a central crater, or centre of elevation. They have increased in size and height from successive lava flows, and the volcanic activity of some of the islands has continued to comparatively recent times. Prof. Agassiz says that it is quite probable that the age of the Galápagos does not reach beyond the earliest tertiary period, and many parts have undoubtedly not been formed before the present period, so that the time is geologically short during which so many animals and plants peculiar to the islands have developed from their South American, their Central American, their Mexican, or their West Indian ancestors.

The sketch of the expedition of the *Albatross* is accompanied by twenty-two indispensable plates, and, at the end, a list of twenty-eight reports on the dredging operations, which are in preparation, with the names of the writers.

Board on Geographic Names.—It may be stated as a summary of the first year's work of the United States

Board on Geographic Names, that seventeen meetings have been held, general principles for guiding its decisions agreed upon, and about 2,000 cases decided. The objects of the Board are already so familiar to the American people that there exists no necessity to rehearse them here. As Dr. Mendenhall says: "The general public, the educators, and the educational publishers have manifested great interest in the work of the Board and its decisions have been generally accepted."

The difficulties encountered in settling the questions submitted relative to Alaskan names made it apparent that nothing short of a complete revision of the geographic nomenclature of Alaska would be satisfactory. Accordingly the Board is now engaged in making such a revision, the results of which will be to furnish a geographic dictionary of the Territory. The decisions of questions submitted by the Lighthouse Board and by the Coast and Geodetic Survey go far toward settling the nomenclature of the coast and lake shores. Fully one thousand differences of usage in county and township names have been investigated and decided.

In the first report of the Board recently presented through the President to Congress, Dr. Mendenhall has an interesting paragraph on the "Origin of, and changes in, names," in which after citing natural reasons, or reasons which are not surprising, he says that railroad companies adopt names for stations different from those of the towns or villages in which they are situated and thus divide the usage. He further says: "To a much greater extent, however, than the railroad has the U. S. Post Office Department confused the nomenclature

of the smaller towns and villages by attaching names to the post-offices, not in accordance with those in local usage." There are thousands of cases where the name of the post-office does not conform to the local name of the place in which it is situated.

The three Bulletins issued are reproduced with additions in the annual report already referred to. The members of the Board serve without compensation, and the printer gets his pay through the courtesy of the bureaus most interested. For instance: Bulletin No. 1 was published at the expense of the Smithsonian Institution; No. 2 owed its appearance to the liberality of the Coast and Geodetic Survey, while the Lighthouse Board launched No. 3. It may not be improbable that the Bulletin method will be abandoned, and the Annual Report hereafter contain the decisions of the Board for the previous year.

Lieutenant Commander Richardson Clover having declined to act as Secretary, Mr. Marcus Baker has been elected to that position.

THE BUREAU OF THE AMERICAN REPUBLICS (under the Department of State), an outgrowth of the recent International American Conference, in its first annual report reviews its operations of the year 1891. It claims that it has stimulated emigration to South America, and through the information communicated has been the means of extending the social and commercial intercourse between the United States and the Latin American nations.

Occasional bulletins have been issued, as follows:

1. Handbook of the American Republics (No. 1).
2. Handbook of the American Republics (No. 2).

3. Patent and Trade Mark Laws of America.
4. Money, Weights and Measures of the American Republics.
5. Import duties of Mexico (tariff of 1888.)
6. Foreign commerce of the American Republics.
7. Handbook of Brazil.
8. Import duties of Brazil.
9. Handbook of Mexico.
10. Import duties of Cuba and Puerto Rico.
11. Import duties of Costa Rica.
12. Import duties of Santo Domingo.
13. Commercial directory of Brazil.
14. Commercial directory of Venezuela.
15. Commercial directory of Colombia.
16. Commercial directory of Peru.
17. Commercial directory of Chile.
18. Commercial directory of Mexico.
19. Commercial directory of Bolivia, Ecuador, Paraguay and Uruguay.
20. Import duties of Nicaragua.
21. Import duties of Mexico (tariff of 1891).
22. Import duties of Bolivia.
23. Import duties of Salvador.
24. Import duties of Honduras.
25. Import duties of Ecuador.
26. Commercial directory of the Argentine Republic.
27. Import duties of Colombia.
28. Commercial directory of Central America.
29. Commercial directory of Haïti and Santo Domingo.
30. Annual Report, 1891.
31. Handbook of Costa Rica.

The tariffs and commercial directories of the several republics have been published in English and Spanish, that of Brazil in English and Portuguese. This series will be continued until completed, when they will be bound in a single volume for free distribution among manufacturers and merchants. There has been a Spanish translation of No. 2, and this handbook will be published annually in Spanish and English, corrected to the first of January of each year. Attractive handbooks of Brazil, Mexico and Costa Rica have been published, and similar volumes concerning Colombia, Guatemala, Venezuela and Nicaragua are in course of preparation. There is a demand for these handbooks from the public schools throughout the country.

The code of nomenclature of articles of merchandise exported and imported is more than half completed.

WEATHER BUREAU.—The Weather Bureau, or Signal Service, as it was known prior to July last, has had sufficient development under the Department of Agriculture to indicate the lines that will be laid down to carry out the expressed intention of Congress in transferring the Bureau from the War Department to the Department of Agriculture. The intention was to develop its work in the interest of agriculture, commerce and navigation. The results thus far attained have a look of great promise.

The transfer, which took place July 1, 1891, included the working force of the old Bureau. The office force at headquarters and the observing force outside of Washington were reorganized. The extent of territory assigned to the latter has been, in many cases,

enlarged, and the restriction of forecasts to twenty-four hours removed to the extent of allowing observers, especially in harvest season, to predict the weather for more than one day in advance, "whenever the meteorological conditions were so pronounced as to make forecasts for a longer period reasonably certain of verification." There has been quite a marked improvement in the weather maps issued at the principal stations, and several stations not heretofore allowed to issue them are now authorized to do so, notably those at Albany and Oswego in New York; at Charlotte, North Carolina; at Charleston, South Carolina; at Marquette, Michigan; and at Parkersburg, West Virginia. The edition of maps at all stations has been very largely increased. Many stations at military posts have been discontinued and others have been established at the nearest city or town, especially if an agricultural college or station is near the locality. Stations of observation will be established in the cotton and sugar regions, from which reports of temperature, rainfall and frost will be telegraphed to a designated centre daily for publication and dissemination throughout these belts. There was an increase of 100 per cent. in the weather display stations inside of three months. The number of voluntary observers has been increased by several hundred. In one instance, the warning of a killing frost in Wisconsin, August 24th, enabled the owners to save by flooding over one-third of the cranberry crop, representing $125,000. Similar warnings enabled farmers in Minnesota and the Dakotas to prevent damage to their crops by the use of smudges, causing a dense

smoke. The Secretary of the Department of Agriculture stated somewhere in his last annual report that *each one* of more than a dozen divisions, whose work he had received, had returned in *actual value* to the county during the past year far more than the *entire annual* appropriation accorded to his Department.

General Greely and some of his predecessors did much to popularize and endear this branch of the Government to the American people. Prof. Mark W. Harrington, the new chief of the Bureau, has facilities very largely increased under the law providing for the transfer to the Department of Agriculture. In justice to General Greely, it must be said that for several years he has persistently urged Congress for legislation that would place the service on the footing which now seems to be assured.

PONKA AND OMAHA INDIANS.—The sixth volume of *Contributions to Ethnology* (Smithsonian Institution, Bureau of Ethnology) is a collection of myths, stories and letters obtained by J. Owen Dorsey from the Ponka Indians, to whom the writer was a missionary from 1871 to 1877, and from the Omahas, with whom he resided from 1878 to 1880. Although this volume is a quarto of 800 pages, the overflow, so to speak, is contained in an octavo pamphlet of about 125 pages, published under the same auspices. These texts will be followed by a Ceghiha-English and English-Ceghiha dictionary and grammar.

EASTER ISLAND.—The extensive and original account of Easter Island, explored in 1886-7 by William

J. Thomson, Paymaster U. S. Navy, has recently been published in separate form by the Smithsonian Institution. It originally appeared in the Report of the National Museum, 1888-9, pp. 447-552. Neither index, nor even a table of contents, accompanies this really valuable contribution to the geography, archæology, natural and civil history of this most interesting locality.

Dr. Charles Girard, a native of France, was for ten years a collaborator with the late Professor Baird in the natural history work of the Smithsonian Institution. He was the pupil and assistant of Agassiz at Neuchâtel, and when the latter came to America Dr. Girard accompanied him and was his assistant at Cambridge, Mass. While in Washington, he also took a medical course at Georgetown College. He remained with the Smithsonian Institution until 1860, when he visited Paris, and during the civil war he accepted a commission to supply the Confederate army with drugs and surgical instruments. He now lives in comparative retirement at Neuilly-sur-Seine, near Paris. While in America he held high rank among descriptive naturalists. His special studies were the herpetology and ichthyology of North America.

Dr. G. Brown Goode, having had for several years in contemplation a bibliography of the writings of Dr. Girard, has now performed that work, and Bulletin No. 41 of the United States National Museum contains a list of Girard's published writings. His career as an author covers a period of about forty years (1850-

1891), and his contributions to science number about eighty-one papers.

SOLAR ECLIPSE, 1893.—Captain McNair, Superintendent of the Naval observatory, remarks,* that the Natal solar eclipse of April 15, 1893 occurs under circumstances so favorable that its observation is extremely desirable. The central line of the shadow sweeps across South America, the Atlantic, and the northeastern part of Africa, and the duration of totality is 4′ 42″ near Ceará, Brazil, and 4′ 10″ near Bathurst, Senagambia. Many of the most important questions relating to the constitution of the sun can be studied only during total eclipses. The whole time available for that purpose is only about three hours in a century. Therefore Capt. McNair says the necessity for utilizing every available eclipse is evident, if we are ever to comprehend that wonderful orb upon which the existence of the human race depends. He hopes that means will be provided for sending one party to Ceará and another to Bathurst.

The removal to the grand new Observatory buildings has not yet taken place.

MOUNT ST. ELIAS.—The height of Mount St. Elias, as ascertained by the National Geographic Society's expedition of 1891, in charge of I. C. Russell, is 18,000 ft., which is 1,400 ft. less than the United States Coast Survey measurement in 1874, and 5,428 ft. more than the La Pérouse measurement in 1786. The position

* Annual Report, 1891.

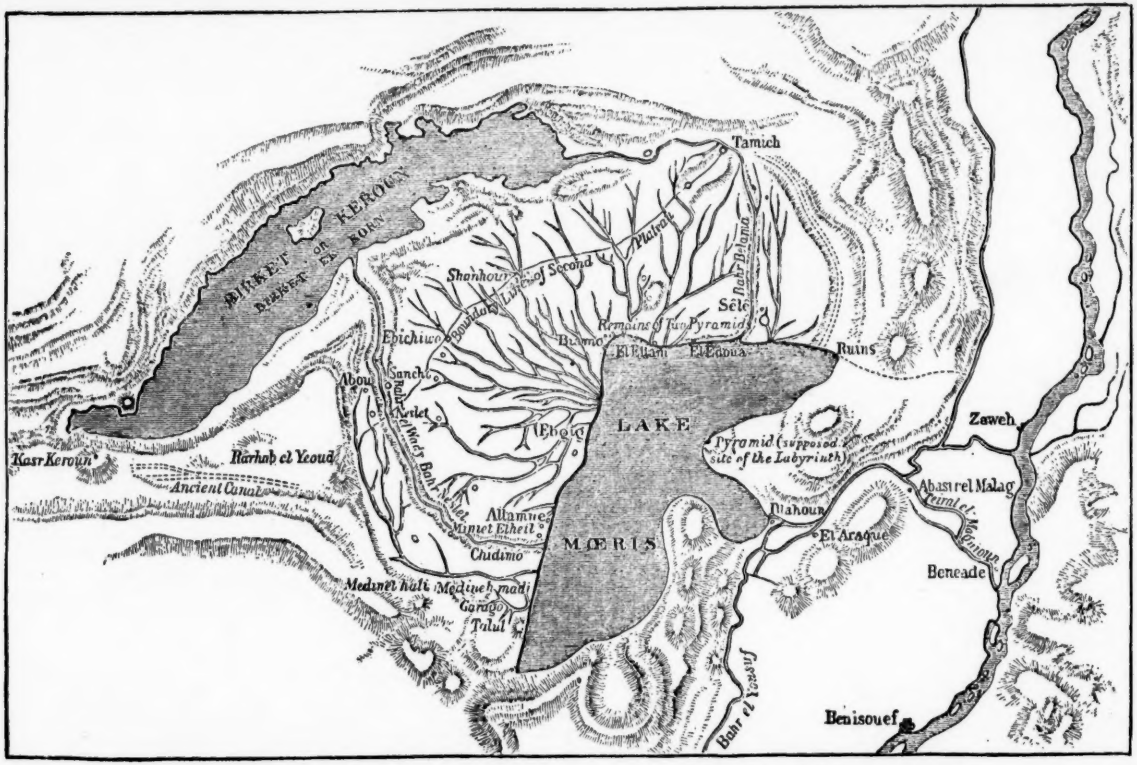
of the mountain by the same authority is Lat. 60° 17′ 51″, Long. 140° 55′ 30″.

Mr. Russell in his report laid before the Board of Managers of the Society, December 11, 1891,* says appropriately "The geographic position of Mount St. Elias is of popular interest in connection with the boundaries of Alaska. In the convention between Great Britain and Russia, wherein the boundaries of Alaska are supposed to be defined, it is stated that the boundary, beginning at the south, after leaving Portland Channel shall follow the summit of the mountains situated parallel to the coast as far as the 141st meridian, and from there northward the said meridian shall be the boundary to the Arctic Ocean. Whenever the summit of the mountains between Portland Channel and the 141st meridian 'shall prove to be at the distance of more than ten marine leagues from the ocean, the limit between the British possessions and the line of coast, which is to belong to Russia, above mentioned, shall be formed by a line parallel to the windings of the coast and which shall never exceed the distance of ten marine leagues therefrom.' As Mount St. Elias is approximately in Long. 140° 55′ 30″ west from Greenwich, as already shown, it is therefore only 4′ and 30″ of longitude or 2 1-2 statute miles east of the boundary of the main portion of Alaska. Its distance from the nearest point on the coast is 33 statute miles. There is no coast range in south-eastern Alaska parallel with the coast within the limits specified by the treaty, and

* Nat. Geog. Mag., v. 3., pp. 231–237.

the boundary must therefore be considered as a line parallel with the coast and ten marine leagues, or 34 1-2 statute miles, inland. The mountain is thus one and one-half miles south of the boundary, and within the territory of the United States. Its position is so near the junction of the boundary separating south-eastern Alaska and the North-west Territory with the 141st meridian that it is practically a corner monument of our national domain."

H.



MAP OF THE FAYOUM, SHOWING THE BIRKET-EL-KEROUN AND THE ARTIFICIAL 'LAKE MŒRIS.'